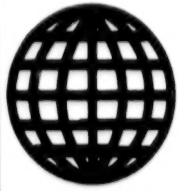


JPRS-EST-95-011

31 March 1995



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Germany: RWTH Scientists Study Diesel Exhaust Filtration Through Ceramic Materials

95P60124A Frankfurt/Main FRANKFURTER
ZEITUNG/BLICK DURCH DIE WIRTSCHAFT
in German 2 Mar 95 p 8

[Unattributed article]

[FBIS Translated Text] Scientists at the Institute for Ceramic Components in Machine Building of RWTH [Rhein-Westphalia Technical University], Aachen (Professor Dr.-Eng. Maier, 52056 Aachen) are studying diesel exhaust filtration through ceramic filters. The long-term behavior of this filter will be observed jointly with the Chair for Applied Thermodynamics. In laboratories and on engine test stands, various material alternatives to the common ceramic filters used until now are being found and their resistance to corrosion and temperature

improved. The investigators want to gain an understanding of how the action of various exhaust components from fuels, lubricants, worn parts, and additives works in order to reduce the soot ignition point. For example, they use glass ceramics as well as different silicon carbide materials as material alternatives to conventional cordierite. The temperature change behavior will be studied with a thermal shock test stand developed for honeycomb-shaped bodies. This makes it possible to record the resistance of diesel carbon filters during filter regeneration through burner capillary tubes, which are shown in the figure (not included). In a direct comparison of the materials cordierite and glass ceramics, it was shown that the unfavorable expansion behavior of glass ceramic (material) is compensated by higher wall thickness. Further studies should be conducted to find material combinations that will permit reliable diesel exhaust filtration.

Dassault Aviation, INRIA Launch Engineering Project

95WS0228C Paris L'USINE NOUVELLE in French
9 Feb 95 pp 58-59

[Article by Thierry Lucas: "Advanced Computing to Speed Up Airplane Design Process"—first paragraph is L'USINE NOUVELLE introduction]

[FBIS Translated Text] Dassault Aviation, builder of the Rafale, is launching a 3-year research program with INRIA [National Institute for Research on Data Processing and Automation]. The goal: to meet American competition by using concurrent engineering techniques.

In a warplane, the pilot's survival depends largely on the reliability of the built-in software systems. But software is just as critical for the survival of the airplane builders themselves: Mastering the exponentially increasing complexity of flight-control and navigation systems has become an imperative for aeronautical manufacturers. "In the context of sharpened international competition, the American aeronautical industry is devoting all its efforts to cutting costs and shortening development times. That's how it hopes to eliminate the European aeronautical industry," says Pierre Bohn, director of science strategy at Dassault Aviation.

To meet this challenge, the builder of the Rafale has opted to cooperate with INRIA in a 3-year program expected to mobilize the energies of some sixty researchers.

Built-In Software

The partnership between Dassault and INRIA is focused on "concurrent engineering," which means finding the most efficient way to organize the cooperative efforts of the various specialists involved in designing a product.

The objective is twofold: reduce costs and development time, while ensuring the reliability of built-in systems. The solution relies on cutting-edge computing techniques: methods of software design and validation, knowledge modeling, symbolic calculation procedures, object-oriented databases, multi-application architecture, etc. Advanced technologies with which INRIA research groups are quite at home, and which Dassault is counting on to create the industrial tools it needs. The task has been divided into five research areas, which together cover all the problems posed by concurrent engineering.

The built-in software for on-board computers is obviously key to the program's success. The objective in the first area is to build a concurrent software engineering workshop for critical software systems. That means bringing together and interconnecting the programming and verification tools, so as to facilitate simultaneous progress by specialists in real-time, algorithms, automation, microprocessors, etc. So Dassault is hoping to augment the productivity of its development software. But the most ambitious part is probably the introduction of advanced software verification and certification techniques to guarantee the aircraft is safe. Some of these studies involve extremely basic

research, but in a strictly industrial context: The workshop will focus its efforts on a real application. The Rafale's braking software, which needs to be modified, especially for the naval version of the aircraft, is one good candidate.

Basic Research

In a concurrent engineering process, documentation plays an essential role, especially in terms of software: Keeping track of versions and configurations is key to the orderly progression of the design cycle. This is why the problem of structured documentation (based on the SGML [Standard Generalized Markup Language] and CALS [Computer-aided Acquisition and Logistics Support] standards) constitutes a separate area of study in the Dassault-INRIA program. Here again, the idea is to integrate the diverse tools of document production in an optic of cooperative editing and management of information security.

The built-in software is not the only thing that needs rigorous documentation: Dassault Aviation is managing a suite of scientific calculating programs (aerodynamics, structure, electromagnetism, etc.) used in airplane design. The aim of the research area dubbed "re-engineering" is to facilitate development of digital simulation techniques, which are of the greatest strategic importance for airplane builders. Specialists in digital calculation and formal logic will develop conversion and numeric code generation tools, with two principal objectives: to "parallelize" programs in order to exploit the power of new generations of supercomputers, and to allow the codes used in different domains to communicate. This is really the heart of concurrent engineering: Dassault envisages such innovations as integrating simulations of fluid mechanics with structural calculations (for dealing with problems of aeroplasticity), and connecting aerodynamic with electromagnetism applications, in order to minimize aircraft drag and radar footprint simultaneously.

Multidisciplinary Problems

The fourth and fifth research areas have to do with fundamental aspects of concurrent engineering: technical memory (acquisition, capitalization, distribution, and exploitation of knowledge) and cooperation between heterogeneous computer applications.

Preserving a program's technical memory is of considerable importance to a manufacturer whose products have "lives" lasting decades. Dassault will undertake to study the various domains involved in aircraft design and the way they interact. INRIA will modelize the expertise, with the help of methods developed for Artificial Intelligence [AI]. Cooperation techniques will open the way for the group to work on resolution of problems involving multiple disciplines. Communication and collaboration between diverse computer applications involves their integration into a multi-application architecture.

The program is ambitious, but its operational spin-offs should not be long in coming. Especially when it comes to export markets, since the whole point is to adapt aircraft to specific demands, in a way that meets the client's time and cost requirements.

[box, p 58]

Genie Program

Called "Genie" (New-Generation Engineering), the Dassault-INRIA research program is divided into two 18-month phases. The budget for the first phase is 40 million French francs [Fr], half of it financed by the Ministry of Higher Education and Research. Dassault and INRIA have already worked together in the past in the domains of software security and scientific calculating. But the Genie program is of unprecedented scope. It has been put together with the specific purpose of obtaining results industry can use in the short term. The first phase will cover five areas: design of critical software, "re-engineering", technical memory, structured documentation, and cooperation techniques. Three PME's [small or medium-size enterprises] spawned by INRIA are participating in the venture and bringing their already industrialized techniques to the program. Ilog is furnishing a reactive-systems programming environment and a knowledge acquisition tool. Methods of formal logic and software restructuring are a specialty of Simulog. O2 Technology has developed an object-oriented database. In the first phase, Dassault will implement specific applications in order to quickly validate the options selected. After 12 months, a performance review will lead to redefinition of the second phase, whose objective is to integrate the various technologies of concurrent engineering previously developed. [end box]

France: SNECMA CEO on Collaboration for Future Engines

95WS0177A Paris AIR & COSMOS/AVIATION
INTERNATIONAL in French 6 Jan 95 p 28

[Article by Daniel Dufour: "European Need for Dual Application of Engines"; introductory paragraph in italics as published]

[FBIS Translated Text] *Bernard Dufour, 61, former president of GEC Alsthom Electrical Engineering, has been chief executive officer of the French aircraft engine manufacturer SNECMA [National Aircraft Engine Research and Manufacturing Company] since October 1994.*

Over the past 50 years SNECMA, heir to Gnome & Rhone and Hispano Suiza, has won a place for itself among the world's four largest aircraft engine manufacturers.

In the military area, the Rafale's M88 is a remarkable success, as is unanimously acknowledged by the Navy, Air Force, DGA [General Delegation for Weapons], and Dassault. Its acceleration capabilities ensured the immediate success of the Rafale's deck landing trials, even though the shipborne version of an aircraft is often the result of a lengthy process of adapting Air Force equipment. So there must be no delay in exploiting that success and developing the new versions of the M88 that the market is calling for.

While improving the Atar and the M53 in accordance with our customers' wishes, we are signing an agreement with Rolls-Royce for the "Tyne Plus." Dassault is offering its excellent Atlantic aircraft to the British Ministry of Defense for maritime surveillance, and we are offering a Tyne Plus with 6,600 hp compared to the previous 6,100

hp and with the suppression of water-ethanol injection. This will give the Atlantic II two extra hours of endurance in target seeking time at 1,000 nm (1,850 km), and a retrofit of the Transall would double its payload in hot weather and/or at high altitude.

In addition, we are working with Turbomeca to market the Larzac in Russia and India through manufacturing licenses.

In the case of civilian engines, SNECMA is building 20 percent of the CF6 and 25 percent of the GE90, the most powerful engine in the world. The CFM56 is continuing its policy of occupying the field in the area of from 18,000 to 35,000 pounds (eight to 16 metric tons) of thrust by offering the CFM Lite and completing its development of new CFM56-5BX versions for Airbus Industrie and of CFM56-7 versions for Boeing.

Over the next 10 years, we foresee an increase of 20 percent in the average size of civilian aircraft, and that means a parallel increase in the power per unit of their engines. This means that the time has come for CFMI [CFM International] to introduce an engine with 43,000 pounds (19.5 metric tons) of thrust for use in particular on the 300-metric-ton A340 and Airbus Industrie's future A322. In the case of the FLA [Future Large Aircraft], the British have now clarified their stand, and I still hope to convince them of the value of a 43,000-pound twin turbofan engine arrangement.

The range assigned to the CFM by the Murphy-Renon agreement runs from 18,000 to 50,000 pounds (eight to 23 metric tons), and it is essential to completely occupy that space. But if there is a European military application, the CFMI is completely willing to work with European engine manufacturers.

The VBM armored vehicle now exceeds 30 metric tons, meaning that it imposes a takeoff weight of from 120 to 130 metric tons on the FLA—the same as that of the future A322. Furthermore, the in-flight refueling mission desired by the RAF will make it necessary to again consider the turbofan.

At a time when money for launching new programs is scarce, dual application—civilian and military—of the same engines is a European necessity.

The turbofan truly remains the engine of the future and one capable of making further great progress.

More generally, aircraft engines are the leading activity in the engineering industry. We still have 600 degrees to go before we come up against the stoichiometric wall, and bypass ratios will continue to increase with their more rigorous engineering demands.

But the rate of reliability achieved by the turbofan is extraordinary. It means that today, 75 percent of trans-Atlantic passengers cross the ocean on twin-engine aircraft, which Aerospatiale [National industrial Aerospace Company] pioneered with the Caravelle and then the Airbus 300 back when U.S. manufacturers were swearing by four-engine or three-engine aircraft. The importance of the aircraft engine industry is such that Germany, which already has the most powerful industry in Europe, has just

joined with BMW in launching a second, fully functioning national engine manufacturing company

Those who talk about giving up and those who are moving ahead cannot both be right.

The vigilant care with which the British Government put Rolls-Royce back on its feet after its bankruptcy in 1971 and Washington's position in considering GE and Pratt & Whitney strategic firms are a perfect indication of the only path to follow.

The engine industry is a matter of sovereignty and of technical progress for the entire French engineering industry.

Of course, cooperation with European engine manufacturers is our rule in the case of tomorrow's military engines—just as cooperation with GE is the basis of our policy in the case of civilian engines. But cooperating does not mean abdicating or disappearing. On the contrary, it means that a fully functioning status is the condition for being an esteemed and sought-after partner. Here again, the worst danger would be the doubt or abandonment inspiring certain people who are quick to yield to discouragement or blind "Monopoly."

With the M88 and CFM56, SNECMA has proven its ability to occupy the first rank among the world's manufacturers of military and civilian engines. It is aware of the changes and progress that must be made, and it is tackling the job.

But let no one object to us that France is poor! Never in all its history has our country been as populated, well educated, well cared for, and well housed as it is now.

Since 1962, this country, exhausted by a century of unceasing warfare, has produced aircraft carriers, Mirage fighter planes, nuclear-powered submarines and nuclear missiles, the Ariane rocket, the Concorde and Airbus aircraft, the Puma, Dauphin, Gazelle, and Lynx helicopters, nuclear power plants, and so on. And at the same time when, for the first time since 1939, foreign exchange controls were being abolished.

So the problem, if there is one, is purely political.

Nations have the industries and jobs they deserve.

France: Advanced Ion-Nitriding Process

95WS0253A Paris AIR & COSMOS/AVIATION
INTERNATIONAL in French 17 Feb 95 p 32

[Article by Nicole Beauclair: "Vide Adour Masters Ion-Nitriding Technique"]

[FBIS Translated Text] The Quali plasma ion nitriding process presented to the aeronautics industry by Vide Adour in Pau makes it possible to guarantee, in real time and in-situ, the quality of the desired nitride layer.

The development of the Quali plasma ion-nitriding process illustrates the cooperation that exists between regional PME (small and medium-sized enterprises) (in this case,

the Vide Adour enterprise) and the University of Pau and Adour Regions (UPPA). The new technique, being assessed if not already accepted by aeronautics purchasers, is according to Andre Marteuilh, CEO of Vide Adour (HIT group), "intended for cutting edge industries requiring rigorous control of ion nitriding."

Ion-nitriding (a surface treatment for metals) offers advantages that have placed it in an important position along with gas nitriding or salt bath nitriding, as explained by Bernard Held, director of the Laboratoire d'Electronique des gaz et plasmas (Gas and Plasma Electronics Laboratory), and professor at UPPA. The main assets of the technique are its easy implementation, nitration savings, control of resulting layers, surface cleaning during treatment, and constant thickness, among others. But conventional ion nitriding does not allow the control of nitriding materials during the cycle. The end of the cycle must thus be reached to be assured of results, without possibility of intervening during treatment to identify any deviations.

In fact, it is accepted wisdom that plasma plays a predominant part in ion nitriding. Without going into details, let it just be said that the system's component parts—housing, generator, gas distributor, and control electronics—have a direct effect on the plasma which can become heterogeneous. Furthermore, the plasma is affected by the shape and layout of the parts to be treated in the housing, which leads to a heterogeneity of the compounds formed in the nitrided layers.

To correct this major drawback, Vide Adour and UPPA worked on adapting the CPS 100 spectroscopic detector which makes it possible to quantify, in real time and in-situ, the level of activity of the plasma depending on the conditions under which the system is used. Technical differentiation of the parameter groups is essential to control, manipulate, and master the ion nitriding process. In addition to the detector, it was therefore necessary to create a database of treatment parameters as a function of the nitrided layer desired, while the discharge and process parameters are adapted and regulated as a function of housing, the part's morphology, charge composition, and the characteristics and stability of the plasma, so as to guarantee stable and homogeneous temperature and nitriding capability. The process feasibility study which led to development of the Quali plasma process by Vide Adour, was conducted with the help of a metallurgical engineer, Andre Marzinotto, a job-sharing employee. Marteuilh points out that without this help, which is available to PMEs such as Vide Adour, "it would not have been possible for us to develop this successfully." Total investment amounted to 1.8 million francs [Fr], including Fr0.5 million for the feasibility study. In terms of a business volume of Fr20 million (subsidiary excluded) in 1994, this was a sizable investment. But it gives Vide Adour (66 employees, including 11 engineers and advanced technicians) an additional technological advantage which will also benefit its branches in Toulouse, Tarbes, and Bordeaux, as well as its Spanish subsidiary, to the great satisfaction of regional aeronautics customers.

France: Ariane 5 Main Stage Components Successfully Tested

BR0603141995 Paris AFP SCIENCES in French
22 February 95 p 5

[Unattributed report: "Successful Test on Key Elements of Main Stage of Ariane 5"]

[FBIS Translated Text] Kourou—On 27 January at the Kourou Guiana Space Center a real ground "rehearsal" of the first launch of the Ariane 5 rocket initially scheduled for 29 November was performed successfully on the main cryogenic stage.

At a rather reduced noise level, simply sounding like a jet aircraft taking off, the Vulcain engine mounted on this stage was run as planned for three minutes and 43 seconds, generating an immense cloud of steam. The computers were asked to counter a number of "failures" purposely generated in the liquid hydrogen and liquid oxygen tank pressurization system to test the behavior of the redundancy mechanisms.

One of the failures simulated led to the test being delayed for over an hour. Initially set for 1600 GMT, it finally started at 1722 GMT. However, this was not because the computers could not handle it but, on the contrary, because the fault was too easy and had to be repeated under "nastier" conditions...

This was the last firing test of the so-called BS series (BS for battleship, designating the reinforced wall structure which makes it possible to test the systems beyond the authorized range). The head of the National Center for Space Studies (CNES) division responsible for the development launcher for this stage, Mr. Hughes Laporte-Weywada stressed: "The BS-6 test was a key stage bringing together all the elements of the main cryogenic stage for the first time, namely the engine, the propulsion equipment, electrical equipment, and the on-board computers and software. Initial conclusions are that this test was highly successful."

The CNES is the prime contractor in the European industry's Ariane 5 program for the European Space Agency (ESA). The cryogenic stage was developed by the French company Aerospatiale in association with the European Propulsion Company for the propulsion part and some 40 other industrial concerns at various points in the manufacture of other associated products. The cryogenic stage is a key part of the future launcher. The development of this stage alone, including its Vulcain engine, will have cost some ECU2 billion—almost 40 percent of the whole Ariane 5 program.

This stage is 30 m in height and 5.4 m in diameter and is contained in the lower section of the launcher. Burning 156 metric tonnes of propellant in 10 minutes it provides all the power needed to get the payload into orbit. This payload could be one or two large satellites (up to 6.9 tonnes in geostationary orbit) but the launcher may in future be used to put manned space capsules (22 tonnes) into low orbit. At the nozzle output the Vulcain engine develops 2,400 MW of power (nuclear power station reactors generate from 900 to 1,300 MW) and 115 tonnes

of thrust, compared with the "measly" six tonnes currently output by the cryogenic engine on Ariane 4.

However, there is more to this launcher than just power. Its reliability (over 98 percent) is dependent first and foremost on this stage which uses technology that is highly effective (and without which the Americans would probably not have landed on the moon) as well as being very delicate: The first two Ariane failures in January and December 1994 were caused precisely by failures in the cryogenic stage. The almost imperceptible expansion of a pump bearing which has not cooled correctly or a microscopic ice crystal formed from air moisture entering a pipe could spell disaster.

Unlike the Ariane 4, which uses a cryogenic propulsion system that ignites in the last phase of a flight, on the Ariane 5 the Vulcain engine ignites first, on the ground, some eight seconds before the lateral powder boosters, thus ensuring the correct operation of this essential part of the rocket before lift-off.

The main stage—whose engine was again tested on the test beds in Vernon and Lampoldhausen on the same day as the BS-6 test (for 300 and 391 seconds respectively)—will now be subjected to a further five firing tests mounted on the flight structures. Then there will be three "qualification" tests which is the last stage before the rocket enters service. The lateral balancing boosters and the upper stage, with storable propellants, are also now entering the final stages of development.

Despite the experimental nature of the first launch which is expected in 10 months time, a "real" payload will be carried on the launcher, consisting of four European scientific satellites for earth plasma studies as part of the Cluster experiment. On 3 April 1996 the second Ariane 5 should launch a capsule produced in the framework of a manned vehicle development project (ARD) and this will be followed by the first commercial launch about a year after the first flight.

First Flight Model of Ariane 5 Nozzle Leaves for Launch Site

95WS0420B Paris AIR & COSMOS/AVIATION
INTERNATIONAL in French 24 Feb 95 p 37

[Article by Nicole Beauclair: "First Flight Model of Ariane 5's Booster Nozzle": "The First Nozzle for Ariane 5's Flight 501 Left SEP (European Propellant Company) in Bordeaux for Assembly in Kourou"]

[FBIS Translated Text] SEP has already produced seven solid-propulsion-engine (SPE) nozzles for Ariane 5 in Bordeaux. "And every one of them was delivered on time," notes Guy Corteel, assistant director of SEP's Powder & Composites Propulsion Division. Five of the nozzles have passed the tests carried out from February, 1993 to November, 1994; two other ground rating tests will be conducted between March and June of 1995. But the eighth nozzle, which SEP delivered to the CNES (National Space Studies Center) 23 February, is a new step: it will be used for Ariane 5's maiden flight, still scheduled for 29 November. Manufacture of the nozzles for the fifth and sixth flights is already underway. Indeed,

the entire production cycle—from materials procurement to delivery—runs two years, including fabrication of the metal parts subcontracted to Fiat Avio in Turin. SEP's Haillan plant handles the composite materials needed to make the nozzle (fabrication of Sepcarb carbon-carbon blanks, elastomers, etc.). But the UTB (Booster Nozzle Factory) does all the finishing, defect inspection, and assembly work. SEP spent 40 million French francs [Fr] to build the factory (see AIR & COSMOS, No 1300, p 17), while the ESA [European Space Agency] delegated financing of the machines and tooling to the CNES, at a cost of some Fr300 million. The plant is sized to produce 10 nozzles a year, or enough for five Ariane 5 launches a year by 1999-2000 (see AIR & COSMOS, No 1498, p 24).

The SPE nozzle measures 3.3 meters high and weighs about six metric tons. It makes intensive use of Sepcarb carbon-carbon and of a filament-wound nozzle cone made of carbon fibers and phenolic-resin-impregnated silicon. These materials enable the nozzle to withstand a gas flow of about 2 tons/second at 3000°C, with no more than the expected few centimeters of erosion after two minutes of operation. "But by the second flight, the SPE nozzle cone will be lengthened by about 80 cm to offset the performance loss caused by an inert mass two tons greater than originally planned (tank aluminum plate, shock absorbing device, remote-sensing system)," adds Jacques Desclaux, head of SEP's space propulsion program department.

Ariane-5 Test Status Reviewed

BR1403085095 Evry *ARIANESPACE NEWSLETTER*
in English Mar 95 p 4

[Unattributed article: "Ariane 5 Tests"]

[FBIS Transcribed Text]

Upper Composite

Since November 1994, environment tests on Ariane 5's upper composite have been carried out at Interspace's Toulouse facilities, led by Matra Marconi Space. These equipment qualification tests under flight conditions make it possible to assess loads on the equipment and the payload environment.

The upper composite comprises the cryogenic main stage's (EPC) front skirt equipped with electrical system, the equipment bay, the storable propellant stage (EPS), the Speltra and a payload adaptor.

Acoustic tests demonstrated good functioning of electrical system; acoustic levels near the equipment remain within margins defined for qualification; noise attenuation within the Speltra is better than specifications.

Several separation tests were carried out on the composite elements to assess the impact of pyrotechnic shocks:

- cutting of the booster's forward attachment at the EPC front skirt level;
- fairing/equipment bay separation by the horizontal separation system of the fairing;
- equipment bay/EPC front skirt separation.

Results are satisfactory and correspond to projections; the electrical equipment operated correctly.

In late February and early March, unstrapping tests will be carried out on the payload adaptors.

BS Tests Completed

The last EPC Battleship (BS) test was carried out on January 31 in Kourou; all major objectives of this test campaign were met.

The development tests with flight-standard tanks will start in early March.

Vulcain Mark II Nozzle

Three tests, totalling approximately 1,600 seconds, were carried out with the modified nozzle to be used on the Vulcain Mark II engine, with satisfactory results.

France: Preparations Resumed for Ariane Launch 71

BR0903110295 Paris *AFP SCIENCES* in French
23 Feb 95 p 6

[Unattributed report: "Preparations Resume in Kourou for 71st Ariane Flight"]

[FBIS Translated Text] Kourou—On 14 February preparations began again at the Kourou Space Center in Guiana for the 71st launch of the European Ariane rocket after the failure of the last launch which has halted launches since 1 December.

This 71st Ariane is to launch the Hot-Bird-1 satellite belonging to the European Satellite Telecommunications Organization (EUTELSAT) and the Brazilian satellite Brasilsat-2. Arianespace has scheduled the launch for 14 March.

The launcher's third stage (H-10) was again blamed for the abortive Ariane launch of 1 December which was the seventh ever failure. The stage has been modified with the installation of a filter at the inlet of the injector for the liquid hydrogen and oxygen that are burned by the launcher's HM7B engine. The 70th launch failed because of a lack of oxygen supplied to the engine gas generator possibly resulting from some kind of pollution. The private American satellite PanAmSat-3 was lost in the failed launch.

Preparations for the 71st launch began again at Kourou on 14 February. The next day Arianespace took delivery of the third stage of the launcher from Aerospatiale at Les Mureaux. The first two stages are already on site in Kourou.

Shipped on board a special Shorts-Belfast aircraft via the Azores in the night of 15-16 February, the third stage arrived in Kourou at the end of the morning and was installed on the launcher on 17 February. All the usual rocket tests will now be run at the same time as the satellite tests. According to the schedule the launcher is to be transferred from the assembly plant to the launch pad on 1 March.

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Germany's MTU Studying 'Ecological' Engine

95WS0180A Paris AIR & COSMOS/AVIATION
INTERNATIONAL in French 6 Jan 95 p 32

[Article by Jost Schmidt: "Toward Economical and Ecological Engines"; introductory paragraph in italics as published]

[FBIS Translated Text] *Jost Schmidt is assistant (executive) general manager for development and marketing for the German engine manufacturer MTU, a subsidiary of Daimler-Benz Aerospace (DASA).*

In recent years, worldwide air traffic has been increasing at a rate of 6 percent annually. Despite a recent slowdown, and by virtue of a steady increase in the world's population, rising prosperity, a convergence of markets, and a reduction in the price of airline tickets, a new increase on the order of 5 percent per year can be expected in coming years.

But without a new or modernized aircraft and engine, air traffic growth of that magnitude would lead to an intolerable deterioration of the environment. So the challenge to be met by the aeronautical industry must be that of keeping up with the increased demand while being able to reduce (or keep at its current level) the impact of the world's air fleet on the environment and the consumption of resources.

The aeronautical industry has always been at the forefront of research and development when it comes to new technologies. What is deplorable, however, at least in Germany, is the decline in financial aid being granted to aeronautical research in recent years. As a result, the government, industry, and institutes in Germany joined together to launch a new national research program in 1994. That program has a budget of 600 million German marks [DM] (2 million francs [Fr]) for 1995-1998.

The immediate priority is to reduce production and maintenance costs. But coming regulations regarding noise levels and polluting emissions will probably nudge concerns into a completely different area. The most significant requirement is very certainly that of reducing carbon dioxide (CO₂) emissions by 20 percent, a step that will mean reducing each plane's fuel consumption by 50 percent. That requirement is expected to take effect by 2005. To meet it, gradually improving existing engines will no longer be enough. Completely new concepts will be necessary. Fortunately, a brief look at the past makes us realize that those expectations are not beyond our reach. Since 1960, for example, carbon dioxide emissions have been reduced by 60 percent, carbon monoxide (CO) emissions are down 90 percent, and the sound level has decreased by about 20 decibels [dB]. To make the rational use of research and development capabilities possible, it is first necessary to evaluate the effectiveness of the measures implemented for improving aircraft aerodynamics, the thermodynamics of engines, and air traffic control. That process has demonstrated that the biggest potential for improvement has to do with engines.

As part of the German national program, action to coordinate research concerning aircraft engines has been started under the designation Engine-3E (Environment,

Economy, and Efficiency). Among the most promising avenues for improving engines in the future, we must include an increase in bypass ratios, the introduction of nonpolluting combustion chambers, and concepts involving quiet engines.

A higher bypass ratio does in fact make it possible to increase propulsive efficiency and reduce both fuel consumption and emissions of carbon dioxide and nitrogen oxide (NO_x). Depending on engine layout, a high bypass ratio will promote noise reduction. The main advantage of "clean" combustion chambers, on the other hand, is that they reduce emissions of nitrogen oxide.

It is very possible to modify a conventional turbojet with a bypass ratio of five and increase that ratio to about nine. This without abandoning the current concept of the direct-drive ducted fan. But higher bypass ratios are hard to imagine without even more modification because of the increased mass and decreased efficiency of the low-pressure turbine.

A new concept is necessary in this case, including in particular the introduction of a reduction gear between the fan and the low-pressure turbine. This in order to use smaller and lighter turbines capable of rotating at high speeds. And since those new engines with a high bypass ratio have a very large diameter, it is preferable to replace the current thrust reversers with adjustable fan blades.

An example of that type of engine is the ADP (Advanced Ducted Propfan), which promises reduced fuel consumption, a 15-percent drop in emissions of carbon dioxide and nitrogen oxide, and a 20-dB drop in sound level.

Because of its complexity, the ADP will have to be compact, light, efficient, and capable of a high rotation speed. As a consequence, growing importance will be assigned to understanding transonic and supersonic three-dimensional flows. But the main challenge presented by high speeds will have to do with mechanical loads, since the lifetime of each component also needs to be increased. Various new materials and concepts are under development, examples being the monobloc bladed disk, composites in an organic, metallic, or ceramic matrix, and intermetallic materials, as well as new surface treating methods.

To reduce nitrogen oxide emissions, the most radical approach consists of modifying combustion chambers. Certain concepts are already being tested, but they will not be put to use until the coming century.

Technological progress cannot be made except through a coordination of research regarding materials, structures, and aerothermodynamics. Research institutions such as the DLR [German Aerospace Research Institute], universities, and manufacturers are working together on this Engine-3E program. To strengthen that cooperation, the DLR and the MTU have signed a cooperation agreement covering basic studies. The program is divided into three phases: research and development, technology validation, and flight tests. Design of the compressor and the combustion chamber has already begun.

This Engine-3E program is part of the considerable effort being made by the MTU to reduce the cost and polluting emissions of future engines.

Germany: Status, Prospects of Hypersonic R&D Program Summarized

MI0703144695 Bonn *TECHNOLOGIE-NACHRICHTEN*
MANAGEMENT-INFORMATIONEN in German
15 Jan 95 p 2

[FBIS Translated Text] Project funding totaling 349 million German marks [DM] has been put into the hypersonic technology program (Saenger), including the ESA [European Space Agency] FESTIP [Future European Space Transportation Investigation Program] program, from 1988 through 1994. Of this sum, Federal Government funding accounted for DM305 million and industrial funding for DM44 million, stated Secretary of State to the BMBWFT [Federal Ministry of Education, Science, Research, and Technology] Bernd Neumann in answer to a question put by CDU/CSU [Christian Democratic Union/Christian Social Union] deputy Dr. Martin Mayer. As a rule, industry had contributed 20 percent to all individual technology projects, whereas basic research had been granted 100-percent funding. In addition to the above-mentioned project funding and institutional funding by the then BMFT [Federal Ministry of Research and Technology], basic research projects undertaken by the DLR [German Aerospace Research Institute] and sponsored by the DFG [German Research Association] had been cofinanced by the leander to the tune of approximately DM8 million.

Neumann went on to report that DM71.8 million had been appropriated to date since 1993 under Phase 1c of the program, but that as early as 1993 only DM10 million of the estimated DM19.4 million had been taken up for project work. BMBF funding to the tune of DM43.6 million had been budgeted for 1994, but, once again, only DM31.1 million had been collected by grantees. In view of the foregoing, a total of DM20 million was being provided for the last time in the 1995 fiscal year to fund hypersonic research. A strategy for shaping the content of the program in 1995, which took account of this sum, had since been submitted by industry. The study undertaken with a view to a subsequent European flight trial would continue.

The joint scram [supersonic combustion ram] technology project would be brought to a conclusion in a reduced form. Collaboration with Russia would not be affected. The ram combustion chamber and nozzle engine components still had to be developed and thoroughly tested.

The industrial portion of Phase 1 of the hypersonic program would thus be wound up at the end of 1995. Hypersonic projects at the universities (DFG special research areas) and the DLR would continue in line with the revised program. The extent to which hypersonic projects would be continued at European level, and jointly with France in particular, would have to be settled over the coming year. In addition, about DM25 million had been set aside by the BMBWFT as the German dues for hypersonic research under the ESA FESTIP program from 1994 to 1996.

The difficult budgetary situation regarding the hypersonic technology program had necessitated funding adjustments and, consequently, a reduction in the program's scope. In particular, as the Bundestag had demanded, the major Saenger project had been relegated to the background and a joint scram technology project had been planned, thus configuring the basis of the technology program in such a way that German industry would remain a competent negotiating partner when the hypersonic program came to be continued on a European level, as planned from the outset. The frequent delays in project work that had been occurring since 1988 and the cuts that had since been made in funding appropriations meant that the content of the projects had to be pruned before the scheduled end of work on Phase 1c in 1995. This also had to be seen against the background of the question mark currently hanging over plans for continuing the hypersonic program on a European level. Nevertheless, the strategy recently submitted by industry would make it possible to bring the hypersonic program to a satisfactory conclusion and to keep options open for future bilateral or European projects.

BMBWFT funding totaling DM96.5 million has been budgeted for Phase 1c (1993 through 1995) studies and technology projects and for FESTIP (1994-1996).

Germany: DASA Proposes Hydrogen-Powered A310 Demonstrator

95WS0240A Paris *AIR & COSMOS/AVIATION*
INTERNATIONAL in French 24 Feb 95 p 22

[Article by Jean-Pierre Casamayou, with Toulouse correspondent Yves Marc: "DASA Returns to Its Hydrogen-Aircraft Project"; "Daimler Benz Aerospace Airbus PLANS to Launch a 'Cryoplane' Demonstrator Based on an A310"]

[FBIS Translated Text] Lack of funds had forced German engineers working on a cryogenic-fueled aircraft to ease up a bit since completion of their feasibility studies (see *AIR & COSMOS* No. 1405). Now Daimler Benz wants to relaunch the project, under the leadership of Airbus Industrie. The manufacturer, which has presented the plane's development program to its consortium partners, is also courting officials in Brussels, in hopes of giving the project the benefits of a European research label. And Udo Dräger, Daimler Benz Aerospace Airbus's new director in Toulouse, is an ardent supporter of the plan.

Two observations have spurred interest in cryogenic aircraft (that is, planes powered by liquid hydrogen or methane - CH₄). The first is that the world's oil reserves are dwindling, which will boost the price of kerosene. The second is the need to reduce pollution in vulnerable areas of the atmosphere. The Germans' feasibility study demonstrated that since liquid hydrogen (LH₂) is produced by hydrolysis, its combustion primarily gives off water. In contrast, liquid natural gas (LNG), a fossile fuel, emits CO/CO₂. Moreover, since liquid hydrogen has a higher energy density than kerosene, "cryoplanes" will boast higher payloads at equal takeoff weights.

Germany's joint research since 1990 with Tupolev, which flew a Tu-155 using LNG, demonstrated that the concept was a sound one. But the Russians and Germans have

since gone their separate ways. The former, who are getting ready to fly a new Tu-156 trijet, are betting on a hybrid kerosene-LNG plane. The aircraft is slated to carry freight between Samara and Rechta in Siberia, an LNG-rich region near the arctic circle where kerosene is hard to come by. The Tu-156s will run on kerosene on the trip to Rechta, and on LNG on the way home. The Germans have opted instead for all-hydrogen.

When Dieter Schmitt, who has since joined Airbus Industrie, headed DASA's [German Aerospace's] preliminary studies team he proposed developing a demonstrator based on an A310. The plane was slated to fly by 2002 or 2003. Feasibility studies indicated that the liquid hydrogen tanks (which take up four times as much space as kerosene [ones]) will be placed above the fuselage, giving the "cryoplane" something like the "Beluga's" shape. The 3.15-meter-diameter tanks will be made of carbon fibers using space industry techniques, and will be separated from the cabin by a reinforced floor. Should problems arise, the hydrogen should escape through the upper part of

the craft. According to Dieter Schmitt, preliminary calculations show that with a wetted surface about the size of the Beluga's, the design is a viable one.

The primary engine modifications involve the combustion chambers. Initial studies conducted at MTU [Motor and Turbine Union, Inc.] show that the chambers will be shorter due to the swiftness of hydrogen's combustion speed. This will make it easy to incorporate the vital heat exchanger. Engineers are currently assessing the impact of hydrogen's combustion temperature, which is much higher than kerosene's, as well as the level of nitrogen oxide emissions.

If all problems—particularly safety problems—are worked out, a production aircraft may be considered. DASA considers the A310, a proven craft, a good candidate. The cryoplane's maximum weight would remain the same as the A310's (150 metric tons), but its frame would be stretched one meter to carry 76 additional passengers another 2,000 kilometers. If all goes as planned, the first A310 "cryoplane" could go into service in 2010.

Interim Results of Prometheus Research Projects Announced

95WS0230A Duesseldorf HANDELSBLATT in German
1 Mar 95 p 23

[Article by Josef Hess: "Using Intelligent Electronic Systems Against Congestion and Accidents in Street Traffic"; "Positive Interim Results of the Prometheus Joint Research Venture"]

[FBIS Translated Text] The industry efforts to handle the growing traffic problems surrounding the automobile using new technology appear to be on the right track. The Prometheus joint research venture, founded in 1986, recently presented its initial results.

Automobile manufacturers and their suppliers in various alliances have started research efforts in a dozen different areas. Some of these efforts are in close cooperation, some are independent. The expenditures for Prometheus, a conglomeration of 13 European automobile manufacturers, about 50 companies in the electronics and supplier industries, as well as over 100 research institutes, are about 170 to 180 million German marks [DM] annually. Two thirds of this amount come from industry and one third from the government. Below is a summary of the current activities.

Vision improvement: The automobile manufacturers Fiat, Jaguar, the PSA group (the brands Peugeot and Citroen), Renault, Saab and Volvo, as well as the suppliers GEC-Marconi, Gilardini, Hella, Husat, Magneti Marelli, Pilkington, Ultralux and Valeo, are active in this area. By the end of the cooperative effort, systems will have been created that considerably improve the driver's vision during fog, rain or darkness. In the northern countries, for example, product development of auxiliary headlights using ultraviolet light has already started. The UV beam of this new development is invisible to approaching vehicles and pedestrians. However, it is reflected as visible light by specially prepared reflectors (beacons, lane markers, permanent obstacles) thereby extending the field of vision of the driver.

Starting in 1995, a passing warning sensor should be developed. By means of a microcamera in the exterior mirror, passing vehicles are detected even in the blind spot. Whether such a complex system can be made marketable, although there are simple split mirrors to be used against the blind spot, is questionable. Then, starting in 1998, an infrared system is to be developed that electronically conditions the driver's field of vision to the front at night and then overlays the resulting images into the field of vision.

Monitoring the traction and vehicle dynamics: Fiat, MAN, Porsche, Volvo and VW are the partners in this set of problems. Despite the well-known advertisement of one large German manufacturer, our automobiles do not run on rails but rather on rubber tires over cobblestones or streets wet with rain—with all the accidents attendant to this. A new system is to warn the driver against inadequate traction between the tires and the roadway. Even the camber on the rear axle is to be monitored when driving

through curves. Because, if one wheel is "brought to its knees," the average driver is quickly overwhelmed trying to control his wheels.

Support during tracking: A frequent cause of accidents is leaving the driving lane (typical for fatigued truck drivers on the Autobahn). BMW, Jaguar, Matra, PSA, and Renault are working on systems for detecting the driving lane using image processing. If the vehicle comes too close to a lane marker, the steering wheel counteracts this with detectable resistance, the driver is warned. The driving lanes must be marked in a manner detectable by the system, of course.

Field of vision monitoring: In the event of poor weather (fog, rain), many drivers tend to overestimate the visibility and drive too fast. This could be remedied by providing appropriate information coupled with a speed recommendation or even speed monitoring.

Monitoring of the driver's state: The partners Ford and Husat are researching the possibilities for monitoring the driver and his current ability for controlling the vehicle. If a driver's ability is impaired, e.g., due to fatigue, stress, or even alcohol or drugs, this state can be checked indirectly by comparing his behavior with that of the normal state.

Systems for collision avoidance: BMW, Daimler-Benz, Fiat, Jaguar, PSA, Renault, GEC-Marconi, Lucas and Thomson are working on systems to avoid accidents due to faulty judgments of the traffic situation with the help of warning systems or automatic action. Individual elements of such systems are already ripe for product development. These include monitoring of the blind spot, a back-up assistant, and a sleep warning device. The Prometheus partners mention 1995 as the year for development of drive information systems with radar sensors, 1998 for automatic emergency braking and the time after 1998 for "intervention systems based on radar and computer vision."

Cooperative driving: The automobile manufacturers BMW, Daimler-Benz, Fiat, Jaguar, Matra, Opel, PSA, Renault, Saab and Volvo, as well as the suppliers Bosch, Matra CAP Systemes and Thomson, have researched the transmission of information regarding the road state and traffic flow. If an appropriate system is to be installed, politicians and the authorities must cooperate with the construction of a network of beacons connected to central control facilities. In any case, product development is to begin in 1995. In a second stage, communication from vehicle to vehicle could be developed in addition to the basic system, but this would not come to pass until after 1998.

Autonomous intelligent speed and distance control (AICC): The danger of rear-end collisions is to be reduced by means of automatic control of the speed and distance relative to each preceding vehicle. In this area, BMW, Daimler-Benz, Fiat, Jaguar, MAN, Matra, Opel, Porsche, PSA, Renault, Saab, Volvo and VW are active. They are supported by the suppliers Bosch, Celsius-Tech, Dasa, GEC-Marconi, Husat, Leica, Lucas and Pilkington. This year, product development, for example, of radar-assisted distance measuring systems, is to begin. The first phase will include a distance warning system and simple control systems with

actuation of the throttle valve or the injection pump. After 1998, expanded systems with braking are conceivable.

Automatic emergency call: BMW and the companies IBR and Draxlmaier have researched the possibility of rapidly detecting and reporting accidents, to protect vehicles involved in accidents against approaching vehicles, and to provide quick help (emergency medical assistance, police), even if injured vehicle occupants are no longer able to call help.

Fleet management: In the case of large vehicle fleets (trucking companies, company motor pools), contact between the central base and the driver by way of cellular telephone already exists. This communication can be substantially improved and supplemented with current traffic information by means of the GPS [Global Positioning System] satellite system. IBM has, for example, already developed a communications platform to connect different communications systems into one network. In addition, the manufacturers Daimler-Benz, Ford, MAN, Volvo and the electronics and supplier companies of AA, debis, GEC-Marconi, MAN Technologie, Nokia and Spectronic are also active in this area.

Dual guidance routing: A digital street map such as that produced by the Dutch company European Geographic Technologies (EGT) for Germany and the population centers of other western European countries, and the traffic information relayed via RDS/TMC radio broadcasts are the two sources used by the guidance routing devices in the vehicle to obtain information. Initial products are already on the market, including Carin, the "intelligent" electronic guide from Philips. The device operates with digitized street maps on a CD and is offered by BMW in the new 7 series. Carin also uses satellite information (the GPS system). Mercedes-Benz, in cooperation with Bosch, is initially pursuing a similar development. Optimized systems incorporating information exchange with the infrastructure should be developed by 1996.

Traffic information systems: Upon request, the traffic participant obtains via RDS/TMC information covering a wide area and referenced to his routes in a language chosen by him. This includes, for example, information regarding public transportation, Park & Ride possibilities and offers for reserving parking spots in advance. Of course, reports on the current traffic situation are broadcast continuously. The following are currently under development: access to traffic databases, portable terminals, RDS protocols for population centers and TMC reports in videotext. All automobile manufacturers participating in Prometheus are involved here.

Photo captions:

Virtual reality: The virtual image of a Mercedes interior, generated by computer, is based exclusively on the design data. In this, each component is broken down into a number of triangles and polygons that cover every curve or edge like a net. For a spatial impression approaching reality, the computer generates 25 to 30 pictures per second, each consisting of up to 30,000 polygons.

A sophisticated hydraulic system moves the projection dome with six degrees of freedom. This creates the subjective impressions that occur during acceleration, braking, or when driving through a curve. An innovation is that the impressions of transverse acceleration can be simulated up to 100 percent. A new extended stroke cylinder moves the simulator laterally.

Germany: Mercedes-Benz Hopes To Standardize Production With Pro-Step

95WS0225D Munich *COMPUTERWOCHE* in German
24 Feb 95 p 22-23

[Article by Eduard Ruesing: "Mercedes-Benz and Suppliers Devote Themselves to Step Format"]

[FBIS Translated Text] Based on the Pro-Step initiative, German auto manufacturers are consistently setting a course toward a standardized product data future. They are doing so in order to overcome the problems that occur when exchanging data based on the old standards Iges and VDAFS. Efforts to achieve a system-neutral standard for exchanging product data now range to the international level. Among the leading forces is also Mercedes-Benz.

If a user wants to put together the heterogeneous modules of a computer-integrated production solution specially optimized for his company in a technically simple and, above all, inexpensive way, this is only possible through officially or at least de facto standardized interfaces. After decades, in some instances, of international and national efforts to develop corresponding norms and standards, the present results are rather pathetic. For even now it is only with large investments and extensive personnel that the user is able, using components from various manufacturers, to achieve integrated computer support for the production throughout the company.

A certain exception to this is the area of product-defining data. The exchange of these data surely plays the most important role within the framework of computer-integrated business concepts in the auto industry. The concept of "product definition" here changes over into the area of geometry description, since precise product description also includes technical or organizational data for example on tolerances, material data, production methods or parts lists. A modern production data exchange is thus not limited to communication between various CAD [Computer-Aided Design] systems, but in addition to design must also include areas such as work planning, production planning and control, manufacture and assembly or quality assurance.

The Way to a Neutral Product Data Exchange

Since the beginning of the 1980s one has been trying to reduce the data communications problems in CAD, both within the companies and with external partners (suppliers). The path taken for this was called standardized, neutral exchangeable product descriptions, standard interfaces for short, which significantly simplify the exchange of data. Iges (Initial Graphics Exchange Specification) and VDAFS (Automobile Industry Association—Surface Interface) had the primary goal of enabling the transmission of drawing and design data (including free surfaces).

Since the end of the 1980s the importance of the product data exchange has grown in practice, for the reason, among others, that it has become the key to integration. The goal of international cooperation is therefore to develop a standard with which it is possible to show and describe all the information that occurs in the life cycle of a product.

The standard developed under the name of Step (Standard for the Exchange of Product Model Data) has been published as an IS (International Standard) in its first parts since September of last year. The requirements which Step will meet are, among others:

- all previous standards will be replaced by Step,
- it must be possible to acquire and transmit the product-describing data without losses,
- from the aspect of archiving data (at least three to four decades for a car), the standard must be flexible for expansion,
- hardware-independence and
- the opportunity to be able to form application-specific subsets.

Step is a standard with an enormous breadth of definition. Wolfgang Renz, head of CAD/CAM [Computer-Aided Design/Computer-Aided Manufacturing] strategy at Mercedes-Benz, says: "For that reason, within the framework of the VDA [Auto Industry Association], we have defined an application-related subset, the so-called AP 214 application data model (AP = Application Protocol), which specifically supports the development process chains in vehicle construction." According to Renz, the German auto builders have succeeded in including the whole worldwide automobile industry in the project, particularly the large Japanese groups (Toyota, Nissan), the three U.S. industry giants (General Motors, Ford, Chrysler) as well as Renault and Peugeot/Citroen in France. The respective umbrella organizations are also involved.

AP 214 will thus become a genuinely international standard, also for the reason that definition is now being worked on as an official project of the ISO (International Standards Organization). Special importance is also attached to worldwide standardization from the aspect of global sourcing to build up an international development and production association. The German head of the AP 214 ISO project, Juergen Mohrmann at Debis Systemhaus in Leinfelden, anticipates that AP 214 will also be available as early as the end of 1996 as an IS norm.

A Subset for Entire Process Chains

AP 214 describes product data for both parts and entire components of cars as application-related Step subsets. The model includes the process chains for the body, power plant, chassis as well as interior equipment and also describes the phases of styling, design, production preparation, development of means of production and methods, construction of means of production and quality control.

According to Mohrmann, in essence AP 214 covers the area for which Step is defined. The protocol is divided into so-called Conformance Classes such as product pattern data, design data and FEA (Finite Element Analysis),

based on which partial implementations then take place, which are able to communicate with one another in a fully compatible way.

For Erwin Nill, who is in charge of the Prostep activities at Mercedes, some of the core elements of AP 214 are: the unambiguous addressing of the parts to be exchanged (among them also version description), the continuation of the geometry representation of wireframe, curve and free surface models (such as were already available in VDAFS) and the newly acquired ability with Step to transmit the most different types of solids.

Another important function of AP 214 is the transmission of product pattern data. At Mercedes-Benz as well the supplier is increasingly becoming a development partner, who not only provides individual parts but increasingly manufactures complete elements or components. With AP 214 a solution therefore had to be found for the assembly structures as well as organizational data.

In the opinion of the CAD/CAM management at Mercedes, the supplier, in particular, benefits to a decisive degree from the establishment of the Step standard, because using Step he will in the future simply be able to exchange data with the most varied auto makers without having to adjust to their CAD structures.

Standards Instead of Directives

On the other hand, the auto maker will not find it possible even in the future to open up the entire variety of markets and cooperation possibilities and prescribe the system for all CAD partners. Says Renz: "Mercedes has never taken this road. Standards are the better solution, because they are broader based and open up more market segments."

It is not the directive but the dialogue that marks Mercedes's relationship with its suppliers. Proof of this is the conference held for the first time in August of last year in the Fellbach regional hall in Swabia, at which more than 500 suppliers discussed the future shape of the CAD/CAM strategy with Mercedes experts.

It is the objective of the workshops initiated there, for example, to generate a guideline with respect to the structure, content, quality and archiving of CAD data models, because: "in practice even good interfaces function only when the accompanying organizational measures are right," according to Renz. Among them is testing the quality of data records at the place of origin, since that is where errors can still be eliminated at relatively little expense. Further, it must be determined how many data may actually be transmitted in a certain period of time. Another difficulty consists of the fact that today there are still a great many system-specific data formats to transfer. In such cases agreements must be made about the internal model structure of the CAD systems.

A number of the problems that now occur in data transmission should be brought to an end with Step or at least be mitigated. A more powerful interface is one way to better communication. A second approach must, according to Renz, be to produce the CAD systems of the

next generation on the basis of a largely standardized architecture, so that data can more easily be exchanged between them.

Some CAD suppliers have already included this requirement in their considerations for new program generations and are making the Step description of the geometry into an internal component of their system.

The method, tested for the first time with Step, of developing the first products in parallel with the standardization process has had the result that processors for conversion are already available. Thus, in September last year Debis presented Step processors for "Catia." Catia is one of the two CAD platforms used by Mercedes. The second one is the Syrko system developed in-house.

Interface for Body and Power Plants

Syrko was specially conceived for processing free surfaces, while Catia is more used in the power plant area. Accordingly, the departments are set up in a dual fashion—here the construction of free surfaces for the body, there that of engines and chassis. The two worlds meet in the area of vehicle integration, where a series of external partners then also meets up with their products. Precisely at this point the high art of integration by means of a clearly improved CAD/CAM strategy is needed.

At present Catia and Syrko are connected through a direct interface. Since Mercedes has developed Step-conforming pre- and postprocessors for Syrko as well, even internal company communication will operate in the Step format in the future.

Thomas Haase, in charge of developing the Syrko Step processor says: "Over the course of time we will let the entire product data communication operate in the Step format, both internally and externally. The sooner we reach this point, the better." The Step ideas would therefore also serve as a guideline in the company for redesigning the old large-scale computer systems for the parts list program and for storing the design data.

According to Haase, there is no CAD supplier in the design field who has not obligated himself to use Step. Additional processors corresponding to AP 214 will be available in the foreseeable future. Haase expects the first prototypes in the field of product pattern data by the end of 1995, prototypes in which some directives have been implemented on the subject of parts lists. Also, in the field of engineering data bases efforts are under way to achieve an alignment of the data structures to the AP 214, in order to be able to write compatible processors here as well.

Italy: Intelligent Automobile Developed

M10703144995 Milan IL SOLE-24 ORE in Italian
17 Feb 95 p 21

[Article by Angelo Gallippi: "Safer Driving with Moblab"]

[FBIS Translated Text] Computer science has made a wide-ranging entry into the automobile field over the last 10 years, creating applications that have contributed both to the improvement of vehicle performance, and to a reduction in the number of accidents, by improving driving safety and comfort. It is sufficient to mention the optimization of road

construction, the introduction of road signs that can be varied according to the traffic situation, and the continued sophistication of vehicle design. The latest construction in this sector is Moblab, an intelligent system to assist driving on suburban roads, designed by a group of Italian researchers coordinated by Giovanni Adorni of the Computer Engineering Department at Parma University.

It is a prototype vehicle equipped with special computers, constructed as part of the CNR's [National Research Council] finalized transport project (subproject Prometheus) and presented in Paris together with another 90 vehicles from all the major European automotive industries. Computers are used to control various functions of the vehicle, and to acquire and process information coming from the systems providing front and rear vision. These are able to display the edges of the road and any obstacles that may be present every tenth of a second, using a special control panel to transmit information to the driver and to advise him of any dangers, thereby enabling him to keep on course and avoid collisions. Naturally the data acquired is "filtered" to remove noise and is processed, given that the system must reconstruct edges and obstacles, based on images of ordinary roads that are not equipped with any special optical indications, or with indications of any other type.

The most critical problem, as far as this type of application is concerned, is the necessity for real time processing. This problem has been resolved by using the paradigm of the so-called "cellular automata," repetitive computing structures that work in parallel to enable sophisticated algorithms for image processing to be implemented. The hardware is called PAPRICA [Parallel Processor for Image Check Analysis] and is a coprocessor, that uses VLSI [very large scale integration] technology, that the Computer Engineering Department of Parma University and Turin Polytechnic have collaborated to build. It is made up of a matrix of special processors. The Adorni group is now facing the problem of achieving fully autonomous driving, and is looking at certain stages of the project again in order to reduce production costs. These should not exceed 10 percent of the cost of all the electronic components present in a vehicle and, anyway, should be comparable with those of the other instruments on board. It has been estimated that it should come onto the market in a few years' time, but experience shows that technology has often untruthfully lowered the most optimistic forecasts.

Moblab is the only prototype of academic origin, against the 90 that have been developed by automobile manufacturers. It is the result of the Prometheus project and shows that our public applied research is capable of producing avant-garde solutions, that are of interest to the industrial sector, although available funding is scarce. This project, like other innovations that were presented to the fourth AILA [Italian Artificial Intelligence Association] convention, held in Parma, should help to change the attitude that many public decision makers have toward artificial intelligence.

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Belgium: Liquid-Hydrogen-Propelled Buses Evaluated

95WS0234C Frankfurt/Main FRANKFURTER
ZEITUNG/BLICK DURCH DIE WIRTSCHAFT
in German 3 Mar 95 p 8

[Article by "Scha": "Liquid-Hydrogen Buses"]

[FBIS Translated Text] Frankfurt—The first liquid-hydrogen-propelled metropolitan bus has been introduced at a research center in Geel, Belgium, as part of the European Union's Euro-Quebec Hydro hydrogen pilot project. It is a matter of four metropolitan buses having

various kinds of propulsion systems that are being supplied by the Hydrogen Systems company of Belgium and by Messer Griesheim. Hydrogen Systems converted the engine for the new fuel, and Messer Griesheim built the liquid-hydrogen tank, including the temperature, pressure and fuel quantity control system. The bus's maximum range is presently 70 kilometers. It can be increased to approximately 300 kilometers by increasing the size of the tank. The time required for filling up with fuel was shortened to approximately 10 minutes by the quick-release pipe coupling developed by Messer Griesheim. More buses of this kind are to be put into service this very year in Belgium, Erlangen and Brescia.

France: Rhone Poulenc Boosts Investments in Gene, Cell Therapy R&D

BR2203122995 Rijswijk *BIONIEUWS* in Dutch
25 Feb 95 p 1

[Report by "SV": "Rhone-Poulenc Rorer Invests Heavily in Gene Therapy"]

[FBIS Translated Text] The French pharmaceutical company, Rhone-Poulenc Rorer (RPR), has announced that over the coming years it is to invest hundreds of millions of dollars in its research project into gene and cell therapy (Gencell). A network of researchers will have to produce results in record time. Through joint ventures with non-company researchers RPR is hoping to strengthen the foundations of its research sufficiently to make it market leader in the field of gene therapy. So far the firm has plowed \$300 million into the project and will invest a further \$100 million over the next two years.

RPR has high expectations of Gencell and is therefore making no attempt to hide its pride. Thierry Soursac, director general of RPR Gencell, said: "Most biotechnology companies always supplied just components. To compare them with the automotive industry, they made bumpers, headlights, or engines. However, even very good headlights or very good engines do not immediately produce an operational automobile."

IntroGene, based in Rijswijk, is the only company in the Netherlands involved in gene therapy. It is not part of the RPR initiative, but has its own network through the Teaching Hospital in Rotterdam, the State University of Leiden, venture capital from Atlas in Amsterdam, and also, recently, from the U.S. firm Genzyme.

Not Impressed

Professor Dinko Valerio, director of IntroGene, was therefore not so impressed by the French investment funds. "It is a major amount, but RPR is not the only company to invest in gene therapy. For example, Sandoz was already doing the same thing five years ago and our deal with Genzyme is also an example of this. What RPR has done is no more than to provide yet further proof that the established pharmaceutical industry sees gene therapy as something which certainly offers commercial opportunities."

"What is special," added Valerio, "is that RPR is forming a conglomerate with an integrated approach. It has acquired in-house technology from top to bottom, from genes and gene sequencing right through to technologies to facilitate progress toward a hospital."

Germany: Encapsulation of Dendrimers Studied for Possible Data Storage

95WS0223A Frankfurt/Main *FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT*
in German 27 Feb 95 p 10

[Article by "trz": "Dendrimers Can Be Used for Encapsulation; DSM Looking for Possible Uses for these Polymers"]

[FBIS Translated Text] Frankfurt—The encapsulation of individual or small groups of molecules makes it possible to produce a new type of composite materials at the quasi

molecular level. These could be used in pharmaceuticals for the delayed release of medication; or in data storage as magnetic particles which are protected from external influences; or for video tapes.

Although primarily hydrophilic and hydrophobic molecules have been used in capsule production thus far, new research at the Eindhoven University of Technology (PO Box 513, ND-5600 Eindhoven) performed with the research labs of the DSM chemical company shows that dendrimers are also suitable for this use. Because of a simpler process technology, this technique also promises to be more economical.

Dendrimers are a kind of spherical polymer which can be created from monomers which are reactive at both ends. Three-dimensionally branched polymer molecules are formed sequentially during the polymerization. But relatively large amounts of interstitial space are still left between the monomers. Other organic compounds can be inserted into this free space during the polymerization process and thus be protected from being dissolved out unintentionally.

So far it has been possible in the lab to use propene imines and chiral amino acids to build dendrimers with up to 64 amino acids. Researchers have experimented with water-soluble dye molecules, among others, as so-called guest molecules to determine how long the dendrimer capsules will continue to protect the encapsulated dye molecules.

These experiments show that the dye molecules remain enclosed for more than three months, even if they are heated. They were not dissolved out by the water and did not color the water. These dendrimers could, for example, be useful in research on photochemical and photophysical processes. With fluorescent dyes, they can also be used as dye markers in nanometer technology.

DSM is currently the only producer of dendrimers and feels it is also able to supply test amounts for experiments. The company is now attempting with university laboratories to find promising areas of application for this new class of polymers.

Germany: Carbon Isotope Used In Enhancement of Breathing Tests

95WS0223B Frankfurt/Main *FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT*
in German 27 Feb 95 p 10

[Article by "JB": "Breathing Test Reveals Stomach Ailments"; "Bochum Method Uses Conversion of Carbon Isotope C₁₃"]

[FBIS Translated Text] Frankfurt—Many digestive tract disorders can be identified using a new kind of breathing test. This has been shown by the Institute for Biomedical Analysis (Technology Center of the University of Bochum, Universitaetstrasse 142, 44799 Bochum). At the core of the breathing test is the carbon isotope 13, whose particular advantage here is its lack of radioactivity. Tests with the isotope can thus be carried out without subjecting patients and medical personnel to radiation. Furthermore, conventional invasive tests can be dispensed with.

Up to now the C_{13} breathing test has been used to quickly identify [the presence of] the *Helicobacter pylori* bacterium. This microorganism, which was just recently discovered to cause gastritis and which probably also plays a role in causing stomach cancer, can be identified with particular ease and certainty by this test.

The Bochum Institute has now developed the test further so that it can be used to identify disorders of the pancreas. In addition to making insulin, the hormone which lowers the level of blood sugar, this organ also makes the enzyme amylase. Unlike insulin, amylase is not released into the blood but rather into the intestines. Its function is to split carbohydrate-containing components in food, and it thus plays an important role in digestion. With pancreatic disorders, there is often a reduction in the release of amylase.

At the start of the test, the patient is given corn starch, which naturally contains the carbon isotope C_{13} . If enzyme formation by the pancreas is not impaired, the starch is broken down and forms the metabolic end product carbon dioxide. This also contains a certain amount of the carbon isotope and can be identified with a mass spectrometer. The smaller the amount of the isotope in the carbon dioxide, the less corn starch is correspondingly being broken down in the intestine. Accordingly, especially low readings indicate deficient pancreatic function.

The breathing test has the advantage of working especially quickly compared to conventional detection methods. Insufficient pancreatic function can be determined after just four hours. Furthermore, the test has no side effects and can be repeated as often as needed. A similar test has also been developed for diagnosing disorders in gastric emptying. In Bochum they are now working on other methods for diagnosing liver and intestinal disorders.

Germany: Cryogenic Techniques Applied To Bioproduction Process

95WS0223C Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 27 Feb 95 p 10

[Article by "Scha": "Paste-Like Substances Made Into Granulate Through Freezing"; "Two Cryogenic Methods for the Food Industry and Biotechnology"]

[FBIS Translated Text] Frankfurt—Messer Griesheim GmbH, Frankfurt, has developed two new techniques for improving the production of high-quality biological preparations from liquid and paste-like product precursors. The "cryobreak" method makes it possible to process liquids and paste-like substances with or without solid contents with liquid nitrogen into a frozen granulate which can be crumbled or cut.

Because of the low boiling point of the liquid nitrogen refrigerant and the direct contact with the product to be frozen, liquids and paste-like substances can be frozen so quickly that the formation of large ice crystals can to a great extent be avoided. In the "cryobreak" method the initial product can, without a drying device, be pumped through a nozzle directly as a stream into a vigorously agitated nitrogen bath.

A relatively uniform granulate results from the rotational movement of the developing nitrogen cloud. The mixture of liquid nitrogen and product is pumped with screw channels into a sieve and is thus separated. The compact construction of the "cryobreak" system and the fact that a conveyor belt can be dispensed with lead to substantially less stress to the product, the company reports.

Since conventional chlorofluorocarbon-containing refrigerants can no longer be used and the chlorine-free refrigerant R22 will not be available until the year 2000, Messer Griesheim has also developed the "cryodry" method which works with liquid nitrogen. Here the products are frozen by means of indirect nitrogen floor area freezing [i.e., by running the liquid nitrogen under the surface on which the material lies]. Due to the larger surface area of the bulk material, the drying time is about 80 percent less compared to the conventional technique.

While the "cryobreak" method can first and foremost be used in the food industry, the combination of the "cryobreak" with the "cryodry" method has been shown to have advantages in a biotechnical preparation process.

Hungary: Pharmaceutical Industry Prospects Examined

General View

95WS0257A Budapest FIGYELO SUPPLEMENT in Hungarian 23 Feb 95 p III

[Article by Attila Karvalics: "Catching Up With Question Marks; The Prospects of the Hungarian Pharmaceutical Industry"]

[FBIS Translated Text] The output of the entire Hungarian pharmaceutical industry approximately equals the capacity of a medium-size Western pharmaceutical manufacturer. At the same time, however, the Hungarian firms, which are small on an international scale, must compete with large, multinational firms in foreign markets. This situation is also becoming increasingly characteristic of our traditional East European markets; they are the subjects of an increasingly forceful sales offensive by Western manufacturers, and in recent years, we are witnessing the same even in our domestic market. In 1990, the domestic market share of Hungarian pharmaceutical manufacturers exceeded 74 percent. This ratio has dropped to 53 percent by 1993, while domestic pharmaceutical sales at current prices increased by 68 percent, as compared to 1990. Domestic pharmaceutical sales in 1993 amounted to 59,937 million forints; 53 percent of the pharmaceuticals sold were of Hungarian origin, while 47 percent originated from abroad. Foreign firms attained the close to 50-percent ratio by selling 15 percent of the total number of pharmaceutical packages sold; this demonstrates well the substantial difference between prices charged by Hungarian and foreign manufacturers. Low prices alone are no longer regarded as valuable [product attributes], however. Although it is possible to temporarily acquire or hold markets with low prices, smaller sales revenues retard research, and this necessarily boomerangs in time.

The Hungarian market was not the only one that underwent drastic changes. Hungarian pharmaceutical manufacturers have lost significant amounts of export revenues after the

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collapse of the CEMA market. Hungarian exports to East European countries amounted to \$440 million in 1990, but in the following year only \$75 million materialized, a fraction of the previous year's export revenues. Although export sales in the East European region have since expanded by about 30 percent each year, the fact that various countries in the region are interested in developing their own manufacturing capacities limits the perspective of continued expansion in the long term.

Some views hold that an increased emphasis on generic drugs, in addition to original products, could become the fundamental direction for future development. Insofar as generic drugs are concerned, certain products of the Hungarian pharmaceutical industry have been accepted in some markets of the developing world (Algeria, Syria, Bangladesh, Egypt, Iran, Pakistan), as well as in East Europe and in the independent republics of the former Soviet Union. Hungarian generic drugs in the form of active agents and non-packaged formulated products also reach the developed countries, but East Europe is certainly going to become Hungary's most important future sales territory.

At the same time, the fact that the Hungarian pharmaceutical industry lacks the classic production base of manufacturers of generic products presents concern: it has neither the technology nor the capacity (large volume, low operating cost production lines) needed. For this reason a majority of Hungarian pharmaceutical manufacturers believe that it would be a big mistake for the Hungarian pharmaceutical industry to choose generic pharmaceutical manufacturing as its goal for further development.

Moreover, except for one or two products sold in large volumes, the Hungarian pharmaceutical industry has difficulty today with charging competitive prices for the generic agents it manufactures. Finished products have no developed infrastructure in terms of either export sales or export marketing. Another retarding factor from the standpoint of acquiring markets is the fact that the direct marketing cost of introducing a new product, or a family of products, amounts to between \$2 million and \$5 million per country, during the first two years. Thus 60 percent of our exports continues to be destined to East Europe.

Hungarian factories are also confronted with several problems when developing original products. Although the former CEMA market was secure from the standpoint of sales, the development of a huge pharmaceutical production capacity was not coupled with necessary profit levels, and based on that, with R&D investments corresponding to international practice. For this reason, the Hungarian pharmaceutical industry fell behind the "leading" group of manufacturers at that time already.

The Hungarian pharmaceutical industry expended an amount corresponding to \$50 million altogether for original R&D between 1986 and 1990, in a period when on an international scale, the developmental cost of a single original product amounted to an average of \$150 million. Despite this, Hungarian pharmaceutical manufacturers developed close to 20 successful active agents into finished products during the past 25 years, but this process and the

introduction of the finished products in the marketplace also required collaboration with strongly capitalized foreign enterprises.

Richter Gedeon's Case

95WS0257B Budapest FIGYELO SUPPLEMENT
in Hungarian 23 Feb 95 pp III-IV

[Article by Ildiko Nagy: "From the Molecule to Success"]

[FBIS Translated Text] In Hungary, Richter Gedeon Chemical Manufacturing Company is the largest spender for R&D purposes, according to the Company's Chairman and President Erik Bogesch.

Most R&D money in the world is expended for space research. This is followed by the pharmaceutical industry, which spends between 12 and 16 percent of its sales revenues for R&D purposes. The ratio in the chemical industry is four percent, and only one percent in the automobile industry. The picture is not overly encouraging if we view the Hungarian market and compare all the fields, because the national average expended for R&D falls below one percent. Compared to this finding, the fact that Richter spent 7.1 percent of its 21.2 billion forints of sales revenues on R&D appears to be very high.

"The main problem faced by research in Hungary is that basic research exploring new action mechanisms—primarily involving molecular biology—is very expensive, and while Western firms, whose sales revenues amount to between \$5 billion and \$8 billion are able to expend \$1 billion for this purpose, Richter can afford only one percent of that amount. Even though the corporation is able to pursue traditional research, this must not be interpreted to mean that the company has no chance for developing a product that holds out the promise of great success," Erik Bogesch said.

"We need to increase the amounts expended for R&D," the chairman and president said. "and shortage of intellectual capacity is not the reason for not being able to perform R&D at the ideal level. More than 10 percent of Richter's 4,600 workers are researchers, and this is an appropriate ratio also in the West. The fact that Hungarian firms are unable to compete with large foreign companies can be attributed only to the lack of capital. According to calculations made in the West, an average amount of between \$270 million and \$300 million is needed to create a finished product out of a new molecule. Under our conditions, however, we could 'get away' by expending only \$40 million to \$50 million," according to the chairman and president. Accordingly, the Hungarian pharmaceutical industry is also capable of developing new preparations, but its chances to do so are best if in the course of development it enters into strategic alliances for given projects with Western firms. The first phase of research costs relatively little, it consumes only about 30 percent of the cost. Richter performs the first phase independently. This involves the preparation of the compound and toxic effect analysis. After learning what the effect mechanism are, Richter enters into an alliance with a Western firm that continues the development, and agrees to pay for the costly clinical tests and for marketing.

Quite naturally, the two companies share the sales revenues in proportion to the amounts expended for R&D. In cases involving jointly developed products, Richter never surrenders its right to manufacture the active agent of the molecule it discovered and produced, and to sell the product at least in Hungary and in the East European countries. The chairman and president states that on a worldwide basis, investments can be recovered in the average only with respect to every tenth product, but such return on investment must also cover all the rest of the investments, the costs associated with the R&D of less successful molecules.

About one fourth of Richter's sales revenues materializes from its own, original products. One should add here: Richter's most successful pharmaceutical called Cavinton, on the market since 1978, continued to produce 17 percent of the sales revenues even last year, and headed the factory's best seller list. During the past 18 years the company produced nine new, original products; this is a favorable ratio according to the chairman and president, because most firms are pleased if they are able to appear in the market with a new preparation once every five years. Fifty-three percent of Richter's sales revenues are based on the sale of pharmaceuticals produced by Richter and protected by trade marks, six percent of the sales revenues are derived from the sale of generic preparations (manufactured on the basis of expired patents), while 16 percent are derived from products manufactured under license.

Export sales represent more than two thirds of the firm's sales revenues, and only one third of the sales revenues result from domestic sales. One reason for this is that foreigners are favored by the Hungarian subsidy system, according to the chairman and president. While in the domestic market about 75 percent of all pharmaceuticals are still products manufactured in Hungary, more than half the amount of all sales revenues ends up in the pockets of Westerners. In terms of percentages, foreigners receive identical subsidies, but since their products are much more expensive, they are better off in terms of the actual amounts of money received. According to Erik Bogsch's calculations, foreigners are capable of reaping profits amounting to as much as 80 percent from the sale of certain pharmaceuticals in Hungary, i.e., they could realize profits amounting to approximately \$200 million. Hungarian pharmaceutical imports have increased from \$50 million in 1990 to more than \$250 million in 1994. While the average price of imported pharmaceuticals is 478 forints, Hungarian pharmaceuticals cost only 82 forints.

How could all this be changed? The chairman and president claims that we should follow the example given by other countries, in which only domestically produced products can be included on the basic list of pharmaceuticals eligible for high amounts of subsidy.

Chinoin's Case

95WS0257C Budapest FIGYELO SUPPLEMENT
in Hungarian 23 Feb 95 p IV

[Interview with Chinoin Chairman and President Miklos Gyorgy, by Judit Dutka; place and date not given: "Becoming Integrated: Survival"]

[FBIS Translated Text] "Every company dreams about a product that produces billions."

[Question] How is the Hungarian pharmaceutical industry—including Chinoin—able to keep up with global market trends?

[Gyorgy] Recognized international firms spend between 10 and 15 percent of their sales revenues on development, but the investment is not always proportionate to the results achieved. Even though several pharmaceutical manufacturers have increased their research budgets, their so-called product profile did not become sufficiently successful to withstand world market competition, and thus these manufacturers were absorbed by larger firms. Accordingly, R&D costs are not always valid indicators.

Throughout its 80-year history Chinoin has been among the research-oriented companies. In the olden days Chinoin had allocated four to five percent of its sales revenues for product development, and this was sufficient under CEMA's protected market conditions.

At present we spend between seven and eight percent of our sales revenues on R&D. Considering the global trend, this amount could be increased, but after analyzing the international experience we concluded that the production of a successful product does not depend solely on the amount of money invested. We found it to be essential to channel our research in a direction in which the accumulated experience provides us with a chance to achieve scientific success. By now, no firm is able to permit itself to conduct general, basic research without a specific goal.

[Question] In what fields does Chinoin concentrate its research?

[Gyorgy] We are exploring processes that go on in the central nervous system, and we are conducting research related to aging, osteoporosis, and respiratory therapy. Only original products that have a profound impact enable companies to survive in the market.

[Question] To what extent did Sanofi utilize Chinoin's accumulated intellectual capital after the merger?

[Gyorgy] One of the factors that motivated Sanofi to become a majority stockholder in Chinoin was that Chinoin already had an internationally recognized positive image in pharmaceutical research. But exactly how this accumulated knowledge is going to prevail under the present, changed international conditions depends on the way we are able to reorganize R&D in the upcoming years. Pharmaceutical research must be placed on new foundations—I have the emerging gene technology in mind—and a greater emphasis must be placed on clinical development than on registering a product. One of the moving springs that prompted our merger with Sanofi was a recognition that only through integration would we be able to survive in the international pharmaceutical market.

[Question] We have already discussed the cost of introducing a new product. How much profit can a successful pharmaceutical produce?

[Gyorgy] A pharmaceutical with a resounding success could produce as much as \$1 billion in sales revenues. Every firm is daydreaming about a product which realistically produces \$500 million in sales revenues, if it becomes an international success. Jumex (a pharmaceutical used in the treatment of Parkinson's disease) is Chinoin's most successful product so far, it produced about \$200 million in sales revenues. By now, no pharmaceutical can be made a success without an international marketing network. This is one reason why our merger with Sanofi was useful.

[Question] How many Chinoin employees perform research and development work, and how much time is required for a good idea to become a pharmaceutical?

[Gyorgy] We have 300 researchers (about 10 percent of the total number of employees), and this is a respectable number even on an international scale. In recent years the corps of researchers has become significantly younger. Half the amount of R&D funds is expended on professional salaries (present day researchers demand substantially higher salaries than before), 20 percent is expended on instruments, and the rest is consumed by the renewal of existing means, the acquisition of base materials, and on the payment of energy costs. All this amounts to between \$15 million and \$18 million annually at Chinoin. Quite naturally, we are working on a continuously increasing number of projects, but it takes 12-15 years before an idea becomes a finished product, ready to be introduced. The longest, most complicated, and most expensive phase of developing a pharmaceutical is clinical testing and registration. Accordingly, we could introduce a new product in the marketplace in the year 2003 at the earliest.

France: Cisco Launches Latest Remote Network Accessing Products*95WS0246C Paris 01 REFERENCE in French
11 Feb 95 p 34*

[Article by Gerard Schmitt: "Routers: Cisco on the Client-Server Route"—first paragraph is 01 REFERENCE introduction]

[FBIS Translated Text] Cisco is opening the way to a migration toward client-server applications. Already announced are two products giving remote sites access to SNA [Systems Network Architecture] networks via frame relay networks.

First of all, the company is enhancing its IOS operating system by adding SNA support with the RFC 1490 (industry standard for direct encapsulation of multiple protocols by frame relay). Beginning in first quarter 1995, Cisco routers are going to benefit from the new feature, which takes data moving by frame relay on SNA networks and encapsulates it into TCP/IP [Transmission Control Protocol/Internet Protocol]. RFC 1490 support will be integrated, at no cost to users, into the IOS (in the case of 2500 and 4500 routers) and into Cisco communication software (in the case of 7000 and AGS+ routers).

New Platform

In addition, Cisco is marketing a physical platform known as CFRAD, specially designed for users that want to replace their SDLC [Synchronous Data Link Control] leased lines with frame relay to reduce costs associated with SNA applications. Based on the 2500 router, the CFRAD unit, which manages the IOS function of SNA on frame relay, is available in two versions: the Cisco 2501 CF (about 15,300 F ht), whose software can also be configured to support Ethernet routing, and the Cisco 2502 CF (about 19,500 F ht), which can support Token Ring. For models 2500 and 4000, IOS has also been enhanced to support the BSC [Bisynchronous Communications] protocol. This feature, which allows integration of bisynchronous traffic into LAN and SDLC traffic, is mainly intended for banks, which for a long time now have been using bisynchronous technology to transmit ATM data from automatic tellers to mainframes. Cisco's BSC support encapsulates bisynchronous activity into packets of PCP/IP data for WAN [wide area network] transmission via serial lines, frame relay, or other WAN transmission methods.

Germany: Virtual Reality Applications Used in Real Problems*95WS0219B Munich COMPUTERWOCHE in German
10 Feb 95 pp 63-65*

[Article by Horst-Joachim Hoffmann: "Virtual Reality Applications For Real Problems: Swabian Capital Becomes Mecca for Artificial Worlds"]

[FBIS Translated Text] Gesticulating, monstrosly bespectacled fellow-creatures, some in armchairs, others standing, fully submerged and firmly attached by cables, cut off from the real world—these are a frequent sight at public fairs:

virtual reality (VR) live! But at the Virtual Reality World '95 in Stuttgart at the end of February, things should look quite different.

This will be the place for all those who are seeking admittance to find information about the international state of the art and about visions for the future. The congress, the fair and the Experience Park in Stuttgart from 21-23 February are to provide for clarity, exchange of ideas, seeing, marveling and understanding.

The developers of artificial worlds are promising revolutionary things for medical technology, architecture, production optimization and assisted living for the handicapped. In addition, there is the 3-D ego trip with mottos like cybersex, adventure games and the like.

If you ignore the specialists, VR owes its previous relative popularity to applications like the data glove.

But what is being presented in the foreground through fun and games in a pleasure-enhancing and curiosity-provoking way has a serious and very recent background. The beginnings of virtual reality can be discerned as early as the mid-sixties, but VR did not blossom until the current era of computer power.

What there was at first was "only" the idea of moving humans and computers closer together, of merging them with one another, so to speak. The fathers of this vision are considered to be Ivan Sutherland, with his ideas of ultimate display and the goal of immersion in simulated computer worlds, and Jaron Lanier, whose California company VPL went on appropriately to be the first to appear on the market with a sensor-equipped data glove. This glove registered hand and finger movements and transferred them to an attached computer for further processing.

But years went by before computers had developed far enough to calculate the necessary simulations. And as so often, the military were the forerunners in this very cost-intensive development. For them, the first goal was the construction of realistic flight simulators and intelligent cockpits.

The first steps of the military, and shortly thereafter of NASA, started a stone rolling. Question upon question arose and—even more important—so did an amazingly large number of possible application areas. Initially NASA concentrated on areas which were important for them and solutions to problems specific to space, such as telepresence, aerodynamic simulation and maintenance of autonomous systems. This is what is reported by VR experts Jeans Neugebauer, Thomas Flaig, Matthias Wapler and Rolf Daeinghaus of the Institute for Production Technology and Automation (IPA) of the Fraunhofer Society (FHG) about the history of virtual reality.

Nowadays professionals and developers are tussling in the fields of construction and design, architecture and internal architecture, robot simulation, teleoperations, medical technology, molecular design and flight and driving simulation.

These are also themes for Virtual Reality World '95, organized by IDG Conferences & Seminars, Mecklermedia

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London and the FHG with the research divisions IPA and the Institute for Ergonomics and Organization (IAO).

In the Swabian metropolis the focus will be on rapid prototyping, simulation, new media, entertainment, architecture, medicine, force feedback, acoustics, hardware and software, among other things. Tutorials, a congress, a fair and the Experience Park with international participants are to make the technological development clearer even to laymen through first-hand information.

We are dealing, after all, with a market which will grow from the current volume of a mere \$200 million in sales almost by a factor of three over the next three years to an anticipated \$570 million in the U.S. alone. Observers from the 4th Wave Inc. of Alexandria, U.S., see the greatest progress as being in applications: sales on the other side of the pond will grow from \$13.2 million to \$95 million by 1998. The values for the entertainment industry are not far behind, with \$13.2 million currently and an increase to \$103.6 million in 1998.

Things are moving in Germany too: the Fraunhofer Institute in Stuttgart is now involved with the research and development of artificial worlds in two institutes at once, the IPA and the IAO, and is also offering a demonstration center.

Virtual reality is a concept which is not yet clearly defined. It requires both interaction and visualization in applications. To meet more stringent criteria for virtual reality, according to VR scientist Flaig, a 360-degree simulation is necessary. In addition, he says that representation dependent on the actual position and orientation of the user's head must be possible. Finally, two separately calculated images guarantee true three-dimensionality.

Interaction with virtual worlds should be accomplished by the most intuitive object control possible—with sufficient mobility in their real, planned and/or desired degrees of freedom. Perfect simulation and interaction in correctly-proportioned 3-D space using the full sensory abilities of the human being in real time—that is the dream goal for developers of artificial worlds.

In the area of practical applications a few things have been achieved recently. In 1994 IBM scored a PR success with the simulation of the reconstruction of the Frauenkirche in Dresden. A Japanese kitchen manufacturer permits customers to walk around hearth and home live and in color. The current spectrum of applications extends far beyond artificial architecture.

Thus IPA scientist Wapler describes work on using this technology in minimally invasive surgery, which offers the surgeon better spatial visualization and orientation. Virtual reality is to be used in the control of miniature surgical tools and in the simulation of operations.

This surgical technology, which significantly reduces the operating field through specific entry and progress towards the site of the operation, is considered a revolution in medical technology. It makes complicated intervention possible with noticeably reduced operation trauma and significantly shorter recovery times.

In this technology, which at the moment is only usable via endoscopy, Wapler points to two particular danger points:

the unintentional injury of organs and the possibility of "actually getting lost inside the patient." The surgeon of the future needs the possibility of three-dimensional spatial orientation.

Extensive experience gathered by the IPA in the deployment of robots in the industrial area is contributing to these medical technology projects. They are based on the proprietary IPA virtual reality system with the "VR-4 RobotS" software which is now being used for control, deployment planning and simulation.

At the heart of this system, along with graphic computers, is a parallel computer consisting of 14 transputers. The existing systems architecture is hierarchically arranged to correspond with the user, hardware, software and data levels, and permits parallel processing of several functions. Examples include communication with input and output devices, calculations for kinematics, collision recognition, graphic preprocessing and actual image production.

According to Wapler the system uses a dynamic symbol algorithm; it assures the achievement of maximal image frequency for the desired degree of detail. This in turn can be preselected and changed, he says. Even at a high degree of detail with more than 60,000 polygons to be drawn per image, the system achieves an output of more than 10 images per second.

But it is not only medicine and architecture which are fields of activity for virtual virtuosi. Another area is prototyping. Thus Hans-Joerg Bullinger, director of IAO, draws attention particularly to the aspect of cost reduction. According to Bullinger, the starting point for this technology is "that a part of the prototypes which are still physically manufactured today will be replaced by prototypes which only exist in the computer."

He says that this substitution involves huge cost advantages, for example in new car development. Virtual collision recognition in the interior out of the driver's view would make the use of new, intuitive tools such as virtual sandpaper practical.

Rolf Dieter Schraft, director of IPA, also cites amazing possibilities for virtual reality in thinking of the role of virtual reality in production technology and automation: a reduction in development time for production plants of up to 40 percent has been achieved.

These savings are possible because the engineers no longer have to depend on an abstract symbolic simulation, but can watch the plant at work even before purchase of the first real robot. Thus possible bottlenecks or too limited ranges can be eliminated in the planning stage.

Code word "assisted living;" VR knowledge on the topic of robot programming and control also contribute to the development of service robots for the handicapped. Here questions of security and ease of use in connection with input devices such as keyboard, joystick, tongue switch or head movement sensor are central. VR offers immense help in optimal adaptation to the requirements of the handicapped.

Virtual reality, as all the experts in this new technology agree, is gaining ground and is well on its way to marking the real world with the stamp of VR. At the same time, human

beings need play and relaxation to live. The navel-gazing in Stuttgart acknowledges that: The Experience Park is opening specially for the entertainment market with extensive possibilities for the step from "here" to "there."

Germany: IAO Completes Study of Parallel Architectures

95WS0222B Munich *COMPUTERWOCHE* in German
17 Feb 95 p 72

[Article by "CW": "Parallel Architectures Still Little in Use; IAO Presents Market Analysis and Overview"]

[FBIS Translated Text] Stuttgart—The Fraunhofer Institute for Labor Economy and Organization (IAO) in Stuttgart has issued a market study on parallel computers.

According to the IAO, parallel architectures were among the most promising modern developments in information and communications technology in recent years. Great increases in performance were predicted and completely new possibilities envisioned. These ideas have since given way to a realistic pragmatism. The IAO has drawn up a market overview with this as background.

The analysis shows, among other things, that the number of systems in use is still small. The support provided is insufficient when it comes to transferring software from a sequential environment to a parallel platform. Clear performance advantages, according to the study, can only be achieved if the system and the running applications are in close, finely tuned adjustment with each other. Moreover, the number and quality of the applications and application libraries as well as the available program developed environments are decisive in the economic success of a computer.

The current market study contains a classification of hardware architectures, an overview of software developments and technical details. Furthermore, it provides market information and a survey of areas of use, applications and application libraries of parallel computers.

Information: IAO Fraunhofer Institute fuer Arbeitswirtschaft und Organization [Fraunhofer Institute for Labor Economy and Organization], Isabella Hofstetter, Nobelstrasse 12, 70569 Stuttgart, Telephone 07 11/970-21 30.

Germany: BDLI Develops Multi-Use Software

95WS0229D Frankfurt/Main *FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT*
in German 2 Mar 95 p 8

[Article by "re": "Using Software Again and Again"]

[FBIS Translated Text] The Federal Association of German Aerospace and Defense Industries e.V. (BDLI) of Bonn has produced a guide entitled "Software Reuse." By reusing software, the development times and life-cycle costs can be considerably reduced, goes the reasoning. At the same time, productivity and quality increase in the development of systems and devices having a high software content. The background for the initiative is the increasing share of software costs in the total costs of a system in the aerospace industry. Ideally, standardized software modules should be developed or acquired in the company for reuse. At this time, reuse of software is at best only in the starting blocks

and then practiced in a very haphazard manner, explains the Association. This is because there are usually technical, organizational and legal problems. If software is reused, for example, in avionics systems, 25 to 45 percent of the development costs or even between 11 and 26 percent of the life-cycle costs could be saved, reports the BDLI (Software Dept., Konstantinstr. 90, 53179 Bonn).

UK: Farnborough Supercomputing Center Performs Numerical Simulation

95WS0241A Paris *AIR & COSMOS/AVIATION INTERNATIONAL* in French 24 Feb 95 p 27

[Article by Christel Tardif: "40 Gigafllops at Farnborough"; "The New British Computing Center Will Use Numerical Simulation to Attain the Precision the Aeronautics Industry Now Requires."]

[FBIS Translated Text] The British Defense Ministry's research agency, the DRA, and British Aerospace are the driving force behind a new computing center that has been created in Farnborough, near London, with the help of GEC Marconi and Cray Research. It will not be your run-of-the-mill number-crunching operation. Now open to government researchers, academic organizations, and industry, the center aims to become one of the most powerful in Europe, limited only by "human ingenuity."

Numerical simulation has become indispensable in many fields. Engineers employ it to cut development costs by ironing out a number of problems before the physical construction stage. The aeronautics industry in particular has entered a technological era in which the nth decimal worked out in engineering and design departments can make or break the performance of a flying craft. Numerical simulations now demand ever-greater precision and a number-crunching ability that traditional computers cannot provide. Enter parallel computing. All the big aircraft makers are interested in using it, for a wide range of applications that include electromagnetic coupling, radar cross section, aeroelasticity (the simultaneous simulation of mechanical and aerodynamic behavior), fluid dynamics, and so on.

In light of this demand—which is not limited to aeronautics—the British have created the "Farnborough Supercomputing Center." The basic goal is to build a powerfully equipped center and to hold down the costs of acquiring and operating hardware by inviting participants from many fields.

The center boasts four supercomputers. Its massively parallel TD3 Cray Research offers a capacity of 40 gigaflops. This means the 256-processor machine can accomplish in one second what it takes a personal computer several weeks and a classic supercomputer several hours to do. Moreover, in keeping with government and commercial hardening standards, it offers users total property security. The center also boasts a six-processor Y/MP8i Cray Research computer, and two Y/MP4e Cray Research machines, one with four processors and the other with two. The four supercomputers are linked in a network and can function either independently or as a unit.

The Farnborough Center aims not only to provide colossal computing power, but to develop codes specific to parallel processing.

First NH-90 Helicopter Prototype Update
*95WS0252A Paris AIR & COSMOS/AVIATION
INTERNATIONAL in French 17 Feb 95 p 17*

[Article by Christel Tardif: "The NH-90 is Proceeding Apace"; "All the Fuselage Sections of the First Prototype Are Assembled and Prices for the Craft Are Set"]

[FBIS Translated Text] The first prototype (PT1) of the European NH-90 military transport helicopter now has all its fuselage sections. In addition, the major part of the fuel system is already installed and Eurocopter France is starting the reinforcement of structures to soon integrate the electric and hydraulic systems as well as the flight controls (conventional for this prototype and electric later).

The craft is expected to be powered by the end of May, when ground testing of each subassembly will begin. These tests are expected to last until October, while in the meantime the first RTM322 "flight-worthy" engines scheduled for September 1995 are expected to arrive at Marignane. In principle, the PT1 will be able to fly in December of this year, only after the CEV safety check.

The basic parts for the second prototype are already being produced by each of the partners—Eurocopter France, Eurocopter Germany, Fokker, and Agusta. Composite sections will be delivered to Marignane by mid-1995.

At the same time, assembly of the ground testing vehicle (GTV) is underway at Cascina Costa in Italy, at Agusta. Designed to validate dynamic systems, from engines to rotors, the GTV is expected to also be operational next September.

The basic equipment choices are as good as made. Among the important equipment yet to be selected, are the flight control computer, flight panel multifunction screens, the vehicle management computer, and the navigation system with its control and display housing (CDU). These choices will be made within months. Specific mission equipment will be selected a little later during the year.

NAHEMA (the program tracking agency formed by the four client governments) also seems reassured by the cost study presented at the end of 1994. In this study, the industrial partners took pains to define a standard utility version representative of a possible "export" version, and to estimate its price. The resulting \$15 million (80 million francs) figure is consistent with prevailing export prices and especially with those for the Cougar and Black Hawk with equal specifications. The study was complemented with options to remove or replace equipment items which were originally planned and which were deemed non essential, thus allowing a price variation of up to 10 percent for a specific version.

France: Naval Air Fleet Modernization Discussed
*95WS0200A Paris AIR & COSMOS/AVIATION
INTERNATIONAL in French 2 Dec 94 p 30*

[Article by Pierre Langereux: "Need for Modern, High-Performance Missiles"]

[FBIS Translated Text] Naval aviation needs new missiles, including SAAM, SLAT, ANL, ANNG, and APTGD...

The armament for France's aircraft carriers and airships (planes and helicopters) has been "sacrificed," according to the Defense Commission of the National Assembly and its rapporteur, B. Cousin, who judges that current capacities present a "mixed picture." According to Cousin, "even though some weapons are advanced," it is clear that "the debt overhang from choices made in the past combined with budgetary constraints is dragging down current capacities of naval weapons systems."

First, some of the oldest—and already obsolete—equipment, such as the Mk54 antisubmarine depth charge and the AS-12, Martel, and R530 missiles have not been replaced. Second, some equipment is inadequately armed for lack of the appropriate weapons, notably the Lynx helicopters, which have no air-to-sea missile since the withdrawal of the AS-12, and the French Panther in absence of the AS15TT light antiship missile. The Lynx will not even get the new Franco-Italian Mu-90 airborne torpedo that is scheduled to come out in 1999. Indeed, says B. Cousin, "We have no intermediate weapon between the cannon and the Exocet AM-39 air-to-sea missile, which is effective but costly: 10 million French francs [Fr] per copy!"

Besides, "Despite their operational limitations (awkward firing modes, insufficient accuracy, etc.)," some air-to-surface weapons dating from the 1960s have been kept in service. Assault aircraft should be equipped with highly accurate, laser guided weapons, but these will be available in very limited quantities, if only because of the cost of the AS30L. In the air-to-air domain, our planes and helicopters will be better equipped, with the laser-guided Magic 2 from the 1980s and above all the new multitarget Mica, with which the Rafale will be fitted in 1999. According to the rapporteur, "The estimated cost for the Navy is about Fr1,450 million for 420 missiles," which means the unit cost of the Mica will be "high" at Fr3.4 million.

New Panoply

For the future, once again, coherent planning demands that a naval aviation group such as the [nuclear-powered aircraft carrier] "Charles-de-Gaulle" be given the most modern weaponry, especially a light antiship missile (ANL) for the future NH-90 helicopter, a supersonic missile (ramjet?) in an antiship version (ANNG [new generation antiship missile]), and a high-precision long-range air-to-surface missile (APTGD). It would also be desirable to offset the loss of the Martel by a new antiradar missile (authorized in the military programs law), and the lack of general-use munitions by "a low-price, modular air-to-surface weapon with specifications defined jointly with the Air Force to equip the Rafale, Super Etendard, Mirage F1-CT, and 2000-D." The multifunction, multi-target missile with a range of 15-40 km could utilize a family of bomb casings to accommodate warheads between 250 and 1,000 kg. But none of these projects has received the go-ahead.

On the other hand, the Charles-de-Gaulle is already assured of its own self-defense missiles including, in addition to 20-mm guns and Sagaie decoy-launchers, two Sadral platforms, the Mistral very-short-range (6-8 km) sea-to-air missile, and above all 32 ensiled Aster 15 SAAM

[surface-to-air antimissile]. There are also plans for a Franco-Italian joint venture to develop an antitorpedo decoy system (SLAT).

As for the existing type F60 and F70 escort frigates, they are equipped with Sadral, Tartar, Masurca, and Crotale anti-aircraft missiles, as well as the Exocet MM38 and MM40 anti-ship missiles, and Malafon anti-submarine weapons—pending the arrival of the future SLASM. The new Horizon anti-aircraft frigates—currently under development in a joint venture between France, Italy, and the United Kingdom—will also be equipped with Aster anti-missile missiles when they go into service in the year 2002.

France: First Test Firing Of Missile Powered By 'Simple' Ramjet

95WS0242A Paris AIR & COSMOS/AVIATION INTERNATIONAL in French 24 Feb 95 p 34

[Article by Jean Dupont: "First Firing of 'Simple' Ramjet Missile"; "This First, Successful Test Simulated an Interception Involving Highly Evasive Maneuvers."]

[FBIS Translated Text] The Landes Test Center has just successfully executed the first test firing of a new, preliminary missile propelled by a "simple" ramjet. Matra and ONERA (National Office for Aerospace Studies and Research) acted as co-chief contractors for the project, with support from the Missiles and Space Directorate of the DGA (General Weapons Delegation.) The manufacturer was responsible for developing the missile's airframe and guidance system, while the Research Office designed and developed its propulsion system. Aerospatiale and SNPE [National Powders and Explosives Company] assisted ONERA through their joint venture Celerg, which made the propulsion system's main components.

The flight program called for simulating a medium-range, air-to-air or surface-to-air interception mission involving highly evasive maneuvers. Another launch featuring an anti-radar air-to-surface mission is scheduled shortly.

What makes the "simple" ramjet attractive is its combination of high performance and low manufacturing costs. The very compact engine can travel a considerable range (about 50 km at low altitudes), at a high average speed that results in considerable terminal velocity at target point. The missile, which uses a solid fuel, will be able to tolerate storage and maintenance conditions identical to those of classic missiles or rounds.

ONERA's self-modulating rocket ramjet consumes only one-third the fuel of conventional rocket engines and is extremely simple to deploy. Just one firing order triggers successive acceleration, transition, and cruise phases.

During acceleration the missile uses a "nozzleless" powerplant, molded right into the propellant block. When the latter is completely burned, it spontaneously ignites the cruise engine. At that point the missile is traveling at a great enough speed to pressurize the air trapped in the air inlets, which mixes with the fuel of the cruise block in the ramjet's combustion chamber. The cruise engine's fuel is termed "self-modulating" because it enables the engine to function across a very broad range without regulation.

Germany To Join French Helios Satellite Reconnaissance Program

BR2403092895 Bonn WEHRTECHNIK in German Mar 95 pp 44-45

[Report by Erhard Heckmann: "Helios Reconnaissance Satellite System—What Is Europe Doing?"]

[FBIS Translated Excerpt] On 12 January, Matra Marconi Space presented the Helios 1A military reconnaissance satellite, which originated from a French initiative and also involves Italy and Spain. Germany and France are shortly to sign an intergovernmental agreement on a satellite-based reconnaissance system, which is likely to start on a bilateral level, subsequently developing into a European project. This is therefore an appropriate moment to report on France's reconnaissance satellite program. [passage omitted]

Helios 1

The Helios 1 military satellite reconnaissance system is being implemented on behalf of DGA-DME [General Delegation for Weapons], with the involvement of Italy (14 percent), and Spain (7 percent). The system comprises the two Helios 1A and 1B satellites and a project control center in Toulouse to guide the satellites. The user component consists of three Helios main stations, one in each user country, for image control, processing, and analysis. These main stations are at Creil, north of Paris, Rome, and Madrid, with the image receiver stations at Colmar, Lecce, and Mas Paloma.

The Helios 1 satellite is a multisensor platform with a specific military useful load. The main sensor is a very high-resolution video camera with a magnetic tape recorder for recording digital image data, transmitted to the ground stations at 60 Mbit/s when the satellites pass over them.

The satellites are pointed by astrosensors. Helios 1A has a mass of 2.5 tonnes, and is to be launched at Kourou from an Ariane 40 rocket during the next few weeks.

Matra Marconi Space's major subcontractors are Aerospatiale, Alcatel Espace, SEP [European Propulsion Company], Alenia Spazio, CASA [Aeronautic Constructions Company], Crisa, and Senel.

Helios 2 and Beyond

The French Defense Ministry launched the Helios 2 program in April 1994; it was integrated into the five-year military program as a top-priority military reconnaissance system.

There was initially no strong German interest in the first invitation at the end of the 1980's to join the Helios program. Budgetary constraints were only one of the many reasons for this. Another reason for declining the invitation was the fact that the satellites' sensors were purely optical ones, thus restricting ground visibility. Germany's change of interest was occasioned partly by the American refusal to provide evidence in the form of satellite photographs of alleged threats.

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Last year France renewed its invitation to join Helios 2. This led to the decision at the recent Franco-German summit to set up an interdisciplinary team of experts, coordinated by the Foreign Ministry, to investigate the possibility of German participation in an observation satellite program. The present situation is that a cabinet decision on the issue is to be made, perhaps in March. The starting point is budgetary constraints: The departments concerned—likely to be primarily the chancellor's office, the Foreign Ministry, and the Defense Ministry—would have to finance the project from their own budgets.

France is expecting Germany to shoulder around 10 to 30 percent of the project. Clarification is still needed of whether a suitable input could be guaranteed for German industry, perhaps in the area of synthetic aperture radar (SAR). The Finance Ministry would be responsible for representing the interests of different industrial sectors during lead discussions. [passage omitted]

Swedish Research Into New Materials for Submarine 2000

95WS0224B Stockholm NY TEKNIK in Swedish
2 Feb 95 p 17

[Article by Sven-Olof Carlsson: "New Materials Form the Sub of the Future;" first two paragraphs are NY TEKNIK introduction]

[FBIS Translated Text] Extreme teardrop-shape with a turret like a fighter aircraft hub, shrouded propeller and nothing but Stirling engines and batteries for propulsion.

This is a concept for a Swedish Submarine 2000. Kockums and the Defense Materiel Agency (FMV) are now studying conceivable technology for the next generation of submarines.

The first submarine in the new Gotland series has just been launched. The submarine Gotland will be taken into service by the Navy in 1996, and the other two subs in the series will come one and a couple of years later. But Kockums and FMV are already well into the process of studying the next generation of submarines.

"All the time we must follow the technical development in the key areas of submarine technology and test new solutions," says Kjell Hellqvist, head of Kockums section for technology development.

"It is important to know what technology is available when it is time for us to order a new generation of submarines," says Ulf Noren, project leader at FMV.

The next generation is called "Submarine 2000." So far this is only a number of technical and user studies undertaken by the FMV itself or ordered from Kockums. During the studies both technological solutions which are close in time and long-range technological developments are examined. In 10 years, at the earliest, Sweden will need a Submarine 2000.

Materials and Form

The most important studies involve the sub's construction materials and form, its machinery and propulsion system as well as the ship's sensor systems. The size of the crew is also an essential factor.

A new Swedish submarine is likely to be built for a crew of about 20, as against 25 in the new Gotland series.

Submarine 2000 is also likely to be given an extreme teardrop shape. The development in the field of materials has advanced rapidly. It is possible to build strong exterior shells even without staying with the normal cylindrical shape, particularly for the depths of the Swedish waters.

Kockums is studying and test-building multilayer exterior shells of various metals, such as various fiber-reinforced metal matrices. Of special interest is steel reinforced with titanium oxide fibers. Here there are still question marks for weldability, a very important property in manufacturing submarines.

Steel-Clad Ceramic

Another conceivable material is steel-clad ceramic—a material that has been tested in tank production. Thin external steel plates provide weldable layers, which simultaneously keep the stronger but more fragile ceramic together.

Reinforced plastics (composites) will also be used in the submarine, primarily in details with a complicated form, which must be particularly strong. The intent is then not primarily to reduce the weight, as in aircraft, for example. Weight is only the third or fourth most important feature among the criteria for a submarine. Above all, it must be energy-efficient and "noise-efficient" as well as function reliably and be easily maintained.

Fiber-reinforced plastic can already be found in the Gotland submarine. The sail's rudders are manufactured of fiberglass-reinforced plastic, primarily in order to reduce maintenance costs.

There are studies which argue in favor of the future submarine having a separate little vessel, a wire-guided "reconnaissance probe" for communication, countermeasures and active reconnaissance. When the big sub no longer needs a sail as support for periscope and antennas, the sail can be reduced to a "bubble."

On the other hand, the mother sub keeps its "long ears," the rows of passive sonar with long range that extend almost the entire length of the submarine. Perhaps in the long term supplemented by other sensors.

The little "reconnaissance probe" with sonar and signal reconnaissance as well as electronic countermeasures and radio communication can then be used without revealing the actual position of the mother sub, and in critical situations it can serve as a dummy target.

Submarine 2000 could be propelled exclusively by Stirling engines and electric batteries, possibly with a small diesel engine for emergency and auxiliary power.

Submarine 2000 is thus likely to have a main power plant with four to six Stirling engines. In combination with traditional batteries, the running time can be extended to at least double that of the new Gotland. But that battery technology could be replaced—although today's technology is advanced and extremely reliable—which further increases the running time.

The multiblade propeller is likely to be shrouded. Earlier tests with fishing boats show that in so doing the propeller gains efficiency. If the "thrust nozzle" can also be turned, the propulsion force increases during maneuvering and the submarine is able to turn faster.

The studies will be followed by practical tests of various mockup ships. Some technological solutions are likely also to be tested in the Navy's old, existing subs, such as the Spiggen minisub.

"The new Submarine 2000 will be at least as great a technological leap in comparison with the Gotland series

as the Sjoormen snorkel sub is in comparison with the diving subs of the Draken series," Kjell Hellqvist at Kockums says very convincingly.

"How far we get in Submarine 2000 will depend on how ready the technology is when the order goes in, of course," says Ulf Noren at FMV.

"After all, the new sub should not just have the best technology. It is also completely dependent on the coordination of the technological know-how of the designers and the capabilities of the crew, so that the Navy can optimally utilize the longer running time in a submerged state."

EU Approves Energy R&D Program

MI1003124695 Rome *ENERGIA, AMBIENTE, INNOVAZIONE* in Italian Nov 94 p 44

[Unattributed article: "EU Research: 1.9 Trillion Lire for Energy Technologies"]

[FBIS Translated Text] The 12 research ministers have given their final approval to part of the multiyear framework program for research into the development of and applications for "clean and efficient" energy technologies. A total of ECU967 million, amounting to around 1.9 trillion lire, will be needed to fund three priority areas of intervention: A reduction in the environmental impact of energy consumption; research into renewable energies; new and more rational forms of using fossil fuels. The launching of cooperation will be promoted at a European or even only at a regional level when the circumstances justify this. The R&D programs alone will cover 45 percent of the total costs, of which 5 percent for fossil fuels, 12 percent for a more rational use of energy, and 28 percent for renewable energies. The remaining 55 percent will be allocated for demonstration projects: 23 percent for fossil fuels; 15 percent for rationalization projects; 17 percent for renewable energies.

EU Environmentalists Forecast 5-8 Percent CO₂ Increase in Europe by Year 2000

95WS0234A Frankfurt/Main *FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT* in German 3 Mar 95 p 2

[Article by Michael Stabenow under the rubric "EuropRACTICE": "Protectors of the Environment in a Dilemma"]

[FBIS Translated Text] The follow-up conference of the signatory countries of the United Nations Environmental Protection Convention of 1992 is taking place in Berlin from 28 March to 7 April under the chairmanship of Federal Environment Minister Angela Merkel. At the meeting the European Union would like to live up to its leading role in environmental protection that it has claimed since the summit meeting of national and government leaders on Rhodes at the end of 1988. Therefore it wants to induce its partner countries to become more strongly committed to combatting the greenhouse effect. One working paper of the European Commission submitted to the EU environment ministers' session on this coming Thursday with a view toward the Berlin conference shows that there is a wide difference between claims and reality in environmental protection in Europe.

It reads in the central report prepared by Danish Environment Commissioner Ritt Bjerregaard and Greek Energy Commissioner Christos Papoutsis that, as it stands today, emissions of carbon dioxide in the European Union could be between five and eight percent higher in the year 2000 than in 1990. However, the authorities do not rule out the fact that, with better use of the individual countries' tax controls and of current energy-saving programs, it is nevertheless still possible to attain the goal, professed in 1990, of stabilizing at the level of that time emissions of carbon dioxide, which is substantially responsible for the warming of ground-level layers of air.

The commission is placing its hopes above all on the time after the year 2000. The authorities consider a reduction by 10 percent possible by the year 2010, assuming that the member countries and industry agree to a number of measures. They itemize five possible priorities here:

- Better use of energy sources, as well as stronger recourse to renewable energy sources
- Materialization of the single European market for energy
- More environmentally friendly use of transportation vehicles
- Use of tax controls
- Use of advanced technologies

The commission admits in its report that the abandonment, declared at the EU summit meeting in the middle of December in Essen, of the project of a community energy and carbon dioxide tax is making it difficult, within the period prescribed, to make good on its promises, made in 1990, to stabilize carbon dioxide emissions. As before, the commission considers environmental protection taxes a non-essential component of the strategy for the stabilization and reduction of carbon dioxide emissions.

But Bjerregaard and Papoutsis advocate a course of action by the individual countries in view of the rejection of community regulation. On the other hand, they point out the danger of possible competitive bias in the single European market and are demanding a minimum of common principles in tax policy. The commission is hoping for a lasting effect on consumer behavior from conceivable progressive increases in the petroleum tax.

The commission is attempting to make a virtue of the need to save energy by calling attention to its consequences for the competitiveness of European companies. It is placing great hopes on the planned Save II EU energy-saving program. The EU projects for the use of renewable and alternative energy sources (ALTERNER, JOULE [Joint Opportunities for Unconventional or Long Term Energy Supply] and THERMIE [European Technologies for Energy Control], for example) could also make decisive contributions to the reduction of greenhouse gas emissions. The commission is counting on a 6.5-percent reduction in emissions through the use of renewable energy sources.

It is the commission's conviction that the materialization of the single European market for energy, which is presently being deliberated by the European Council of Ministers, could contribute in particular to better use of energy resource and less waste. Transportation, which presently accounts for around a quarter of carbon dioxide emissions, also offers a considerable potential for savings. In fuel consumption by motor vehicles, a reduction in emissions by up to 40 percent is possible in the next 10 to 15 years, they say. But the commission stresses that the increase in traffic will grow stronger in the years to come. A shift toward environmentally friendlier vehicles is urgently called for here, they say.

Bjerregaard and Papoutsis make it clear in their report that a decisive responsibility is in store for the member countries of the community during the coming proceedings in

Berlin and beyond. In exceeding the stabilization goal set for the year 2000, the EU will have a harder time moving developing countries in particular toward environmental protection efforts, they say. At present the countries of the EU account for only 16 percent of carbon dioxide emissions. In view of economic and demographic growth alone, the battle against the greenhouse effect will be decided primarily outside the community. However, not least for this reason the EU partners must set a good example, they say.

The commission's forecast for the year 2000 is a bit more encouraging than a statement by the authorities in October 1992, according to which the stabilization goal could fall short by 11 percent. The authorities attribute this to a number of community and individual-country energy-saving programs agreed on since then. The current model of a five- to eight-percent rise in carbon dioxide emissions is based on the assumption of average annual real economic growth of 2.5 to 3 percent, as well as a gradual rise in crude oil prices from \$20 to \$30 per barrel (159 liters) in the year 2010 (at 1987 prices).

Germany: RWE Plans Nationwide Electricity Network Cooperation

95WS0225B Munich *COMPUTERWOCHE* in German
24 Feb 95 p 5

[Article by "gh": "RWE Wins Over Power Companies for Nationwide Network Cooperation"]

[FBIS Translated Text] Essen—The wrangling for the best starting position in the coming liberalized telecommunications markets continues. After the recent announcement by Veba AG concerning a cooperation with Cable & Wireless, RWE [Rhineland-Westphalian Electricity Works] AG has now gone public with plans for a nationwide network cooperation. The Essen energy group, together with six German power companies, wants to offer a telecommunications network that covers the whole country. At the same time speculations are intensifying regarding an alliance with AT&T.

According to its own information, no later than 1998 RWE AG, along with six German power supply companies (EVU), will jointly utilize already existing telephone and data networks. A corresponding framework agreement is just about to be concluded. In addition to the Essen energy group the participants are Badenwerk AG, Berliner Kraft und Licht AG (Bewag), Energieversorgung Schwaben AG, Hamburgische Electricitaetswerke AG, Vereinigte Energiewerke (VEAG), as well as Vereinigte Elektrizitaetswerke Westfalen AG (VEW).

The intended cooperation will primarily involve utilization of existing networks by the energy companies mentioned above. When Telekom's telephone service and network monopoly is abolished in 1997, the intent is thus to couple together a nationwide high-speed network in order to make it available to service suppliers and later also to the general public. Whether this project will end up

in an application, anticipated by many experts, for a license for nationwide telephone service is something an RWE spokesperson would not comment on to *COMPUTERWOCHE*. In order to decide this one would first, according to the official line of approach, have to wait for the licensing procedure of the Federal Ministry for Posts and Telecommunications, for which neither the time nor the content has been determined at this time.

Regardless of this, the rumors about an international telecommunications alliance between RWE and AT&T were reinforced by a report in the *WALL STREET JOURNAL*. The talks between the two companies are said to have intensified, according to the U.S. financial newspaper, and it is assumed that they will shortly be completed. Meanwhile, confirmation that talks are under way and about their content could not be obtained from the RWE group headquarters in Essen. However, insiders definitely expect that the Americans will enter the German market.

Germany: BASF Seeking Environment-Friendly Fertilizers

95WS0234B Frankfurt/Main *FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT*
in German 3 Mar 95 p 8

[Article by "rwg": "Fertilization Ensures Stable Crop Yields. BASF: Rejection of Fertilization Lowers the Harvest Without Benefiting the Environment"]

[FBIS Translated Text] Frankfurt—Whoever rejects fertilization does harm over the long term to the soil's fertility and lowers the crop yield without the environment's getting anything out of it. This was found out by researchers at BASF AG's [Inc.'s] Agricultural Research Station in Ludwigshafen. Whoever adds to the soil too little or even no nitrogen fertilizers has to count on crop losses of up to 60 percent already after six years. This was shown by two long-term studies at three research areas in Baden-Württemberg, Schleswig-Holstein and Lower Saxony.

The interim results of the experiments planned to the year 2004 have already shown that the wheat yield is lowered by 20 percent when only half of the plants' nutrient requirement is covered over a period of six years. The yield drops by even 40 percent when the addition of mineral nitrogen is totally done without, BASF explains.

Once the soil's fertility has been reduced, it cannot be adjusted so quickly again by increased fertilization. Also, adding an overdose of nitrogen fertilizer to the soil cannot remedy the reduced fertility overnight. Yields comparable to those of an area continuously taken care of according to requirements will not be attained for several years. But whoever would like to accept the loss of yield for the sake of the environment, now, will not reduce the displacement of nitrates, the BASF researchers explain. Nitrates are a component of nitrogen fertilizers, of organic fertilizers and of humus, that can wash out of the soil and enter the groundwater.

Belgium: System for Cleaning Waste Water With Bacteria Described

BR1303134395 Amsterdam *TECHNISCH WEEKBLAD* in Dutch 22 Feb 95 p 8

[Report by Gerard van Nifterik: "Bacteria Chasing Away Heavy Metals From Waste Water"]

[FBIS Translated Excerpt] [passage omitted] *CHEMISCH MAGAZINE* recently reported about a bioreactor whose system was developed by the research team of Ludo Diels from the Flemish Technological Research Institute (VITO) in Mol. The Flemish reactor extracts heavy metals from waste water.

Research in Mol focuses on a bacterium which, under certain conditions, acts as an ion exchanger. The microorganism ejects metal ions from the cell and injects protons into it. As a result, outside the bacterium cell a basic environment is formed which has an excess quantity of metal ions. In addition, the bacterium metabolism produces carbon dioxide, and the combination of all these factors creates an environment in which metals such as carbonate salts and hydroxy salts precipitate. The production of these crystals goes on until the bacterium dies. So the precipitate contains a small quantity of dead biomass.

However, the fact that the microorganism eventually dies off as a result of its own crystal production does not mean that the reaction stops after a while. Thanks to the growth of new cells the reactor continues to work. By changing process conditions attempts have been made to minimize the loss of bacteria. The purpose was, of course, to reduce the quantity of organic waste to a minimum.

In order for the VITO reactor's principle to be workable in practice, the bacterium has been housed in a 200-micron thick membrane. The water to be cleaned flows on one side of the membrane, while on the other side a solution with which the microbe feeds itself is supplied. This process has the advantage that the nutrients do not get into contact with the water to be cleaned, so that no additional contaminating materials must be added to the waste water. In addition, this excess quantity of nutrients added can be reused.

The cleaned waste water, in which metal carbonate/hydroxy crystals are found, is then led to a column containing glass beads and to a sand bed. This step is intended to filter out the metal crystals. Finally, regeneration with acid extracts the metals from the sand and glass bead column.

Compared to chemical methods such as flocculation and electrolysis, there are additional advantages, Ludo Diels claimed, especially when dealing with small quantities of contaminations. Flocculation and electrolysis are used for concentrations of approximately 100 ppm, for concentrations lower than 1 ppm these methods are not efficient and, all things considered, rather expensive. In these cases, Diels said that the Flemish bioreactor is very suitable.

VITO's system is capable of extracting cadmium, copper, palladium, nickel, lead, and other metals from waste water. VITO is currently negotiating with several companies to apply the system.

Italy: Membrane Filters Reduce Water Consumption

95WS0247C Frankfurt/Main *FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT* in German 6 Mar 95 p 10

[Article by "ghi": "Membrane Filters Reduce Water Consumption"]

[FBIS Translated Text] Frankfurt/Main—Membrane filters that work according to the principle of reverse osmosis could improve the purification of waste water from closed cooling cycles. Within the framework of a European Brite-Euram program, a filter development by the Italian company Separex SpA (Via Per Oropo 118, I-13051 Biella/VC) is now being tested in the laboratory and will later be tested in a facility through which flows a water volume of three to five cubic meters per hour that needs to be purified. As a result one expects lower water consumption, less use of chemicals and the opportunity of being able to build the purification plants smaller.

In the course of a cooling operation the water becomes enriched with salts, corrosion residues, microorganisms and with the most varied particles. Membrane filters that catch solid and dissolved pollution have not been fully satisfactory so far, the researchers explain. Polyamide-thin film material in general becomes ineffective under the influence of chlorine, and cellulose membranes are not sufficiently resistant to higher temperatures.

The goal of the new development is a retention rate of at least 80 percent of the total substances dissolved in the cooling water and a water recovery rate of 60 percent. Should that be achieved, it would be the equivalent of reducing the water consumption by about 30 percent.

Israel: German Two-Pipe System Tested for Energy Transport

95WS0212B Frankfurt/Main *FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT* in German 2 Feb 95 p 8

[Article by "toz": "Energy Transport by Means of the Methane Cycle. Israel Testing German Two-Pipe-System Technology"]

[FBIS Translated Text] Frankfurt—Solar energy, as other forms of energy, can ordinarily be transported over large distances only with substantial loss. Even its conversion to transportable hydrogen by the electrolysis of water has still not been totally mastered. Yet there is the possibility of storing the energy content chemically in a less aggressive compound and of taking it in this form over considerable distances to the place of consumption.

Because Israel has no reserves of its own of fossil fuels, solar energy plays an important role. Till now, however, it could be used only in the neighborhood in which it was produced. Now a development program of the Weizmann Institute (Solar Research Facilities, Rehovot, 76100 Israel) that uses an energy transport technology developed in Germany is to provide a remedy.

Here the energy will be transported in a gas mixture of carbon monoxide and hydrogen. It is to be pumped in a closed two-pipe system from a solar energy generation plant to consumers or consumption centers, where it will be released as heat in a reverse chemical reaction with the formation of methane. The methane will then be conducted back again to the solar plant.

The project has by this time developed to the extent that an experimental plant having a capacity of approximately 450 kilowatts is to be installed this very year in an Israeli desert area. To capture the solar energy it uses an array of 64 mirrors that can "concentrate," i.e., focus, sunlight in two

stages. Then methane is decomposed into carbon monoxide and hydrogen in an attached high-pressure reaction chamber.

For the present only a short pipe system is being built for the experimental system, in order to gain experience with the materials suited for this purpose, which have to withstand the embrittlement of the pipe material because of the hydrogen present. The first reformer for the decomposition of methane to a large extent matches a reaction vessel that was developed by the German Aerospace Research Institute. For the second reformer for the recovery of methane it is a matter of an Israeli redesign of a so-called William Davidsson [as written] methanator.

EU: EDID; Environment for Distributed & Integrated Design Project

95WS0227B Paris L'USINE NOUVELLE in French
26 Jan 95 p 55

[Article by Thierry Lucas: "Early Stages of Remote Cooperative Design"]

[FBIS Translated Text] The European project EDID is developing a set of tools designed to facilitate design tasks from remote sites

The object of remote cooperation is to design collaboratively with partners at multiple sites. This is of particular interest to Aerospatiale which is constantly faced with this problem, both in connection with the Airbus program and with satellite development. Hence, the active presence of the Aerospatiale Satellite Division in the EDID (Environment for Distributed and Integrated Design) project, in Cannes, as part of the Race European program aimed at developing tools for cooperative work.

Pascal Coquet, head of the EDID project at Aerospatiale, explains that "the goal of such a system is to reduce development costs and delays. But it must also improve the quality of cooperation between industrial partners."

Initial experiments have already shown what international meetings will be like in the next few years: everyone stays home at his workstation, but everything takes place as if the partners were working around a table. It is like a videoconference but it goes much further. Data and software are shared, whatever their point of origin, while participants jointly develop or modify the drawing or specification displayed on each screen.

Access to High Volume Networks Becomes Imperative

In addition to Aerospatiale Cannes, the BT [British Telecom] laboratory at Ipswich (Great-Britain), the University of Cranfield (Great-Britain), and Onera at Chatillon in the Paris region are participating in the experimental EDID network. These partners are not all specialists in aeronautic or space projects, by any means. But they were selected for their competence in cooperative work and for their easy access to high volume networks.

There is no remote cooperation without the capability of exchanging large volumes of data in real time. To achieve this, EDID is relying on emerging technologies which will constitute the networks of tomorrow, and first among which is the ATM (Asynchronous Transfer Mode) pilot network.

The computer tools of cooperative design are the other key element of the system. To demonstrate its efficiency, the members of the experimental network adopted the scenario of a cooperative satellite design. At the scheduled time, the four sites begin a videoconference. Each workstation screen displays a vignette of the teammates, accompanied of course by voice connections. Everyone can hear and be heard, and the work session can begin.

Meetings Approved with Electronic Signatures

The University of Cranfield, here acting as sub-contractor, points out to Aerospatiale an assembly problem with one of the satellite's tanks. The 3D CAD model is extracted from the database and immediately transmitted to all the partners, who follow explanations by zooming and rotating the model. Once they all identify the problem, the drawing must be reworked. It is placed in a shared electronic document, a blank slate to which everyone can contribute interactively. Once everyone agrees about the modifications, the last step is to write up the report of the meeting. Here again, interactive collaboration is the rule as everyone can choose what to write into the report. The modified drawing, which saves all the contributions from the partners, is itself incorporated into the report. Last but not least, is the approval. Thanks to the authenticated electronic signature system, in one hour's time, the "virtual meeting" concludes with an immediately operative decision.

These prototype technologies must now be validated by cooperation of a more industrial nature. Several projects of this sort are planned as part of the European Acts program which is the continuation of Race. Calls for bids have been issued.

The Six Stages of Cooperation

1. The document server is built around Aerospatiale's object-oriented Baghera database, used to manage satellite projects.
2. The audio, video, and graphics conference is a prototype software program developed by IBM for remote sharing of graphic applications (such as CAD [Computer-Aided Design] software). Each participant sees the application as if it was executed locally and each can act on the model displayed on the screen.
3. Impact analysis. When modification of part of a system is requested by a partner, the MIA (Modification Impact Analysis) program ascertains the modification's consequences on the other components. MIA was developed by Onera and SLX, using distributed artificial intelligence technologies.
4. Coherence control. The Intelligent Mismatch Control program developed by the University of Cranfield, is a module which detects geometric incongruities among the components of a CAD-modelled image.
5. Negotiation scenario. The partners follow a step-by-step negotiation scenario. With the multi-agent approach developed by Onera, each user and each program is considered as an agent. Collaboration among these agents leads to the solution.
6. Approval. The report of the meeting must be signed by the participants. A system of authenticated electronic signatures based on chip cards and encrypting algorithms was developed by the AQL company.

French Develop Superplastic Forming/Diffusion Bonding for Aerospace Manufacturing

95WS0239A Paris AIR & COSMOS/AVIATION INTERNATIONAL in French 24 Feb 95 pp 18-19

[Article by Nicole Beauclair: "Superplastic Forming at Hurel-Dubois"; first paragraph is AIR & COSMOS/AVIATION INTERNATIONAL introduction]

[FBIS Translated Text] Hurel-Dubois is using superplastic forming/diffusion bonding to lighten certain sub-assemblies while trimming production costs. The first application will be the BR710.

The superplastic-forming machine installed at Hurel-Dubois's Meudon plant since September of 1992 was not—as is often the case with a new investment—purchased for a specific aeronautics project. Rather, it is the outcome of a research and feasibility program whose results the equipment maker found conclusive. Although the machine is part and parcel of a research program (see boxed material), Hurel-Dubois assistant general director Jean-Pierre Brusson stresses that the company financed it using its own funds. (The cost came to over 5 million French francs [Fr]). But the equipment was used in feasibility trials for both Hurel-Dubois's developments and those of Ratier-Figeac.

Superplastic forming exploits the ability of certain alloys to stretch under specific temperature, pressure, and strain rate conditions without undergoing any perceptible change in mechanical properties. The process enables manufacturers to make larger and more complex parts in a single cycle, trimming production costs by eliminating assembly. The process applies to both aluminum and titanium alloys. With titanium, diffusion-bonding (DB) can be performed during the same cycle, giving rise to the SPF-DB process, which can be used to produce box-type structures. Diffusion bonding occurs at superplasticity temperatures. By inserting barriers to diffusion where bonding is not desired, it is possible to produce closed structures by blowing gas between the metal sheets, which flatten themselves against the two sides of the mold. Diffusion bonding can create honeycomb structures using three or even four metal sheets (see AIR & COSMOS, No. 1201 and 1377).

Hurel-Dubois wanted to develop in-house expertise in the technique, in order to use SPF-DB in mass production if the feasibility study proved conclusive. However, since new certification programs for existing products are time-consuming and expensive, SPF-DB must be factored in at the design stage and thoroughly mastered. "We must look at new programs," affirms J.-P. Brusson, "if we want to take advantage of everything the process has to offer."

The feasibility program involved some 150 production cycles for experimental parts. Hurel-Dubois's work centered mainly around a mixed-flow reverser door, which it mass-produced in stainless steel. The results, presented by Christophe Kauffmann, head of the technology department, are convincing. When made of superplastic titanium, the door is 31 percent lighter than traditional stainless steel versions. This weight saving results from the lighter box (55.5 percent in Ti compared to 82 percent in stainless steel), fittings (13 percent in Ti against 15 percent

in stainless steel), and mounts (0.5 percent for SPF-DB compared to 3 percent with a classic structure). Designs using SPF-DB also cost 38 percent less than classic ones: 21 percent against 31 percent for raw materials; 6 percent compared to 11 percent for tooling; and only 35 percent against 58 percent for labor costs.

But SPF-DB offers still another, more important advantage: the dimensions of the parts produced match those of their forming molds exactly. All these selling points only strengthened Hurel-Dubois's desire to apply superplastic forming techniques to production parts.

Consequently, the BR710 engine, for which Hurel-Dubois is developing and making the pod, is benefiting from the fallout of the Meudon firm's research. The thrust reverser (see AIR & COSMOS, No. 1499, p 56) will consist of a dozen titanium parts, mainly spar structures, formed by SPF-DB. In addition to all the SPF-DB advantages already-cited, the use of titanium is especially well-suited to this reverser, which reverses not only cold but warm flows. There is little doubt we will see new developments involving SPF-DB, not only for airplanes, but for helicopters.

[Boxed Material]**DGAC Supports a Superplastic Forming/Diffusion Bonding Program**

DGAC/DPAC (General Civil Aviation Directorate/Directorate of Civil Aeronautic Programs) delegated management of the program to develop superplastic forming/diffusion bonding to the DGA's (General Weapons Delegation) STPA (Aeronautics Programs Technical Department). But as Jean-Christophe Cardamone, chief research and weapons techniques engineer for the STPA, pointed out, "Funding was provided only for the research and hours of study and development spent on the machine. The manufacturers paid for the machine itself."

The five-year-long SPF-DB program kicked off in 1989 after some brainstorming on the repercussions the technology might have on equipment makers. Indeed, practically the only industrialists to develop SPF-DB in France are the aircraft manufacturers, namely Dassault and Aerospatiale.

Ratier-Figeac and Hurel-Dubois signed on to the program with joint development goals related to their specialties. Although the two companies were making different parts—mixed-flow reverser doors for Hurel-Dubois and fast-helicopter-blade spars for Ratier-Figeac—they had one key point in common. The mating face of both parts is not incorporated into the box's mass, which complicates the SPF-DB process.

Development consisted of three phases, explains CRWTE Cardamone. The team, composed of STPA and engineers from Ratier-Figeac and Hurel-Dubois, spent a year on research and design questions, and on tailoring parts to meet the requirements of production process sheets and of the only material that could be used in the study, titanium. A conclusive technical and economic feasibility study then led to phase two, which involved developing the production process sheets and setting up the equipment needed. At the same time, engineers spelled out the machine's characteristics, keeping in mind that the partners had decided to install just one SPF-DB machine. During this

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phase, says CRWTE Cardamone, tests were run on the machine at Aerospatiale's Louis Bleriot Research Center in Suresnes to "break in" certain technological aspects of the process. The third phase got underway in January, 1993; engineers conducted feasibility tests, analyzed results, and decided whether SPF-DB was feasible. At this point the machine had been put into service at Hurel-Dubois.

Ratier-Figeac has traditionally made its helicopter blade spars of carbon. But the French manufacturer wanted to be sure the technology would not simply "mimic" what its own could do, notes Robert Gaiani, assistant general and industrial director of the Lotois company. Gaiani also stresses the firm's desire to cut production costs and weight, and to insure that the first fast helicopter blades manufactured could withstand high temperatures.

The problems encountered in SPF-DB manufacturing of the spar have to do with the wide variation in thicknesses. These range from 1 to 5 mm for the walls of the twisted spar to 20 mm for the insert that makes up the blade root. Development work, notes Robert Gaiani, supports the following conclusions: "The dimensional precision of the forms compares very favorably to that of traditional spars; an SPF-DB titanium spar weighs 35 percent less than a solid aluminum spar, but 11 percent more than a carbon one. However, the cost of an SPF-DB titanium spar is about 50 percent higher than a carbon or aluminum one, due primarily to material costs, which account for 58 percent of the total." Although the technology allows for some improvements—a reduction in material, a new spar design using more sheets of thinner metal, a blade root made using a flat insert—Ratier-Figeac has not adopted it for now. Research, says R. Gaiani, has optimized the carbon spar process, which remains competitive for this application. "But we still have our eye out for potential ways of applying superplastic forming to our own products," says Gaiani.

Germany: RWTH Studies Higher Precision in Machine Tools by Thermal Compensation

95WS0229B Frankfurt/Main FRANKFURTER
ZEITUNG/BLICK DURCH DIE WIRTSCHAFT
in German 2 Mar 95 p 8

[Article by "sel": "Higher Precision Through Thermal Compensation"; "Thermally Caused Misalignment in Machines Is Reduced"]

[FBIS Translated Text] The RWTH [Rhine-Westphalian Institute of Technology] Aachen considers itself as having the lead in the future-oriented area of high-precision manufacturing. This area forces manufacturers to compensate for heat-induced imprecision in machine tools. The topic of thermal expansion has been researched to such an extent that the German competitors have a good jump on their East Asian competition. This was noted by Professor Manfred Weck (Professorship for Machine Tools).

The positioning accuracy of advanced machine tools is in the range of micrometers thanks to the powerful control system, high-resolution distance measuring systems and mechanical guides and feed drives manufactured with extreme precision. The exact position of the workpiece,

referenced to a tool zero point, changes due to the heating of the machine during operation, however.

The power lost in bearings, gears, motors, the process heat of the chips, the cooling lubricant, and changing ambient temperatures result in constantly changing machine temperatures and consequently changed tool dimensions. A factory air-conditioning system that could keep temperature fluctuations within a few degrees Celsius is often not feasible for cost reasons, says Weck.

The optimization programs developed at the Laboratory for Machine Tools and Applied Economics based on finite element methods can now ease the work of the designer. There are a few areas of freedom in construction design to make a machine thermally stable. These include first reducing the power loss by improving the efficiency of bearings, gears and motors. Heat sources that have no effect on working precision and are located near the machine can be moved, too.

Measures also include the use of materials having a high thermal capacity and low coefficients of expansion, and the targeted insulation of heat sources. Additional measures are necessary because the machine must be designed not only according to thermal considerations but also in accordance with static, dynamic, ergonomic and economic factors.

In the Institute, thermal misalignment is countered by means of compensation using the machine control system. The principle behind this compensation is to acquire knowledge of the machine behavior during a learning phase and to describe this behavior mathematically. Then, the misalignments that occur during normal operation can be calculated in advance and taken into account as correction values by the control system.

During operation, only the relevant machine temperatures need be measured. The use of compensation for different machines has shown that a reduction in the thermal misalignment by up to 80 percent can be achieved at acceptable cost.

UK: Rapid Prototyping Helps To Bring Products to Market Sooner

95WS0247A Frankfurt/Main FRANKFURTER
ZEITUNG/BLICK DURCH DIE WIRTSCHAFT
in German 3 Mar 95 p 8

[Article by Peter Odrich: "Draft Design for Visual Prototype in Just 24 Hours"]

[FBIS Translated Text] Belfast—Three-dimensional computer-supported design techniques (CAD) unquestionably have their advantages. But at the same time there are numerous instances where the designer, in addition to the graphic on the monitor, must see his new design as a finished object as quickly as possible, because more and more companies are finding themselves increasingly pressured by the competition to shorten the time between product idea and marketable product.

All these considerations have caused Queen's University of Belfast in Northern Ireland to establish an Automotive Design Centre. As the head of this purely commercial

institute, Dermot D. Sterne, explained, one of the important reasons for founding this center is also, of course, that the university would not be able to afford a number of the new, expensive machines desirable for the tasks described without additional commercial utilization.

Initially, 1.2 million pounds or not quite 3 million German marks were invested in this equipment, while at the same time buildings and other facilities were made available by the university. Seventy-five percent of the money for this was provided by the European Union and 25 percent by Queen's University.

An institute that undertakes the fastest possible conversion of computer projects into hardware for designers from companies was created. The emphasis of these customer projects is on the automobile supplier industry since it is one of the key industries in Northern Ireland. According to information, the institute is already operating at a profit.

Once a designer's product concept has been established on the CAD monitor, the corresponding computer data are transmitted by diskette or modem to the institute, which then within a few hours produces a scale model of the product from acrylic or epoxy resin. This takes place in a working process that is reminiscent of computer tomography in medicine.

The "model" of the design stored in the computer is divided into slices, each of which is one-tenth of a millimeter thick. An analysis of each slice is followed by the production of a plastic model, which is then glued to the preceding one and onto which the next slice is applied. At the end the entire piece is there, and it is subsequently briefly hardened in an oven.

No later than a day after transmitting the data the designer thus has the part in his hand—and with a quality that, if needed, even permits the corresponding casting forms or other tools based on this model to be ordered.

Usually, this model first goes to the company that will make it, so that its production-related comments can be taken into account. But this stage on the way toward the final model also benefits significantly from the rapid production of a model that is absolutely true to scale. The basic method for this is called Rapid Prototyping.

The main incentives, the sharp decrease in development time and the connected drastic drop in development costs, have led to the fact that the institute in Belfast has long since begun working for entirely different customers than the automobile suppliers alone. An example of this is aircraft manufacture.

A complete plastic model of a future pressure-resistant aircraft bulkhead could now be seen at Belfast. Using the completed piece the designers can test the correctness of their design in view of multiple components later connected with the bulkhead. For the porcelain and ceramics company Wedgwood the institute has, in the fast way described, produced a model of a vase with the three-dimensional portrait of the firm's founder.

The institute's newest branch of activity is medicine. Most recently, based on computer tomography data models of patients' bones or joints are being manufactured for the surgeons at Queen's University of Belfast. The surgeon who will later operate can thus look at the defects in detail and test appropriate treatments even before the surgical treatment. For cranium operations and surgery on the patient's spine, the drill holes can be precisely planned.

There is now a multitude of supplementary techniques available for this process. For example, the intention is next to use ABS synthetics in producing the models. New applications are constantly opening up using the growing variety of materials.

As Sterne explains, the reason why Queen's University of Belfast does not offer these services in the customary way through one of the existing institutes is that the potential customers value absolutely reliable delivery as quickly as possible and are only prepared to pay for that. But under academic management these narrow time frames cannot be implemented. "Delivery within a maximum of 24 hours" just does not fit into the teaching of an academic institution.

Finland: Fibrocom Develops Technique for Producing Easily Shaped Fiberglass Material

95WS0229C Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 2 Mar 95 p 8

[Article by "ghi": "Easily Shaped Composite Material"]

[FBIS Translated Text] Sandwich-type composite material having a honeycomb core is widely used due to its low weight and its high degree of stiffness. However, such material can only be shaped under certain conditions and then at great expense. In contrast to this, sandwich materials woven of fibers can be shaped as desired. To this end, the Finnish company Fibrocom Oy (Laajalammiintie 10, FIN-50160 Mikkeli) has developed a new method of weaving and procedures for shaping the semi-finished product to the point where it is ready for market. As explained by Mauri Laitinen of Fibrocom on this topic, glass fibers are usually woven. However, carbon fibers and other fiber combinations can also be used.

The special feature of the new weaves is that they are drawn through channels with a size and shape that can be selected. If they are filled with a core material, rigid, stiff elements are created that can be coated with various materials. After the resin in which they are soaked has cured, the core material can be removed again. This further reduces the workpiece weight and also eases the shaping process. The open channels can then be used to pass cables, gases or liquids.

Many parameters can be changed to provide custom-designed materials. Besides the fiber and core materials, for example, the cross section of the channels can be changed to match requirements. Even hollow shapes, such as pipes, can be easily produced using this technique.

France, Germany To Exchange High-Power Laser Technology

BR0203145995 Bristol OPTO AND LASER EUROPE in English Mar 95 p 8

[Unattributed article: "Franco-German High Power Laser Center Will Act As Information Exchange"]

[FBIS Transcribed Text] Up to 50 French and German scientists and engineers are due to start work at a new centre in Paris this September to transfer high-power laser technologies between their two countries.

The Centre Franco-Allemand des Lasers de Puissance is a 50-50 partnership between Fraunhofer-Institut für Laser-technik (ILT) and a group of three leading French research organisations, the CEA [Atomic Energy Agency], CNRS [National Scientific Research Center] and DGA [General Delegation for Armaments]. Although its budget is still being decided, the centre is likely to need public money for at least 50 percent of its start-up capital.

ILT has worked with the Club Laser de Puissance (CLP), the French industrial group helping to set up the centre, on joint European projects over the past eight years. The centre will exploit this existing partnership to lobby Brussels for money.

"We think that France will bring its strengths in basic research, excimer lasers and shock hardening to the centre," said Alain Quenzer, president of the CLP.

"Germany will offer industrial know-how, and its ability with solid-state and CO2 lasers and systems."

In particular, ILT is interested in French research on laser interactions with materials. French organisations that intend to work with the centre include: Sopra, which developed a 1kW laser as part of EUREKA [European Research Coordination Agency]; CEA, the atomic energy agency, which has long experience in welding with Nd:YAGs; and Thompson, which has a common interest with Siemens in materials processing with laser diodes.

The Institut de Soudre, a welding institute in Lorraine, will offer researchers access to 10 to 25 kW and possibly 45 kW sources. France Renault Automation, PSA, CEA and Institut de Soudre are interested in robotics and automation.

Quenzer added that the centre may eventually have purpose-built laboratories. The French aim to create a centre of industrial excellence around the organisation by siting it close to universities, research bodies and industry already strong in lasers.

Germany: Fraunhofer Scientists Automate Lens Coating

95WS0234D Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 3 Mar 95 p 8

[Article by "eka": "Edges of Complex Lenses Are Being Coated Automatically. Fraunhofer Scientists From Jena Introduce Two Coating Processes"]

[FBIS Translated Text] Frankfurt—Efforts are being made in the optical industry, too, to automate manual manufacturing processes. A typical manufacturing process is the blackening of the edges of lenses for cameras, endoscopes, microscopes and other optical instruments in order to prevent troublesome light from being scattered laterally from the edges of the lens and mounting. Scientists at the Fraunhofer Institute for Applied Optics and Precision Mechanics have now succeeded in managing without expensive manual work even for lenses having complicated geometry. Two different coating processes have been developed.

In the first case a double hollow needle moves past at a definite distance at the surface to be coated, while small gear and peristaltic pumps continuously deliver the coating material and carry it away in a closed cycle. In the process drops of coating material form at the tip of the hollow needle and remain clinging to the glass surface by adhesion.

In the second process compressed air through a nozzle applies the coating material. The component to be coated is gripped with its axis in the vertical position between two cupped gripping points. As soon as the drive starts the lower gripping point rotating, it takes with it both the component and the upper freely moving gripping point. The gripping points' function is also to cover the working optical surfaces so that the mist, diffusing in the air carrier medium, of finely atomized drops of coating material does not foul these surfaces, so that no subsequent cleaning is required any longer.

The Fraunhofer Institute for Applied Optics and Precision Mechanics (IOF, Dr.-Ing. habil. Volker Guyenot, Schillerstr. 1, 07745 Jena; fax: 03641-52963) reports that both processes make it possible to coat lens edges of geometrically complex optical components very uniformly with a light-absorbing and refractive-index-matched coating of high surface quality. Its thickness reportedly varies not more than a hundredth of a millimeter.

One reads further that with the institute's processes a cost-producing gap has been closed in the otherwise automated manufacture of high-quality lenses. The process reportedly cannot only be adapted easily to the most different manufacturing conditions, but is also friendly to the environment because of the low consumption of coating material. It promises considerable advantages especially to small and medium-sized companies that manufacture high-quality specialized optics in smaller numbers of pieces.

Thus far it has still been predominantly customary to apply black coatings by hand with a brush and felt-tip pen to the lens edges outside the optically effective area and to wipe the excess coating material off the surface. During this treatment the lenses are fastened to a turntable by means of low-pressure suction or insert fixtures. Japanese manufacturers have already automated this process. They are building equipment in which precision nozzles spray with a coating the edges of lenses that have been caused to rotate. However, this method is suited only for simple lens structures manufactured in mass production, but not for complex optics, the Jena researchers say.

German Research, Progress in Optoelectronics Surveyed

95WS0235A Duesseldorf HANDELSBLATT in German
1 Mar 95 p B10

[Article by Achim Scharf: "Fast and Compressed: Light Transmits Data"; first paragraph is an introduction]

[FBIS Translated Text] Optoelectronics can lead to technical breakthroughs and to completely new information systems. BMFT [Federal Ministry for Research and Technology] is supporting to 1998 the photonics program, whose first results were presented recently.

Tuesday, 28 Feb 95 (HANDELSBLATT)—Broadband information transmission, under which heading also come trunked telephone and data transmission channels, in long-distance traffic is founded predominantly on fiber-optic circuits. Typical of optical fibers or optical waveguides is the fact that information digitally modeled as light pulses is transmitted via laser diodes (electrooptical transducers) and is reconverted into electrical signals by photodiodes at the receiving end. Because optical fibers have been quite fully developed technically by now, the development of powerful broadband networks that are also profitable depends especially on innovations in optoelectronic components.

But optical signal processing and optical communication technology could initiate quantum leaps in computer technology too, because of more efficient signal processing. The Federal Ministry for Research and Technology (BMFT) for this reason supported the development of optoelectronic components under the title "Photonics" with around 95 million German marks [DM] in a first phase from 1990 to 1994.

Thirty-Five-Gigabit-per-Second Laser Diodes

Close cooperation has developed between universities, contract research institutes and industry because of this program, and this cooperation will continue in the next four years too with DM110 million in support money.

What a large role optoelectronics is playing for information technology was demonstrated after the recently presented results of the first phase. It is maintaining the competitiveness of the domestic telecommunications industry.

For instance, laser diodes with a bit transfer rate of 35 gigabits per second were developed at the Fraunhofer Institute for Applied Solid-State Physics (IAF) in Freiburg. Just under 250 high-definition TV (HDTV) signals could be transmitted simultaneously by these over a fiber-optic line. A gallium-arsenide-based photodiode developed also at this institute takes it to 20 gigabits per second.

According to BMFT, these results outstrip equivalent research in the U.S. and Japan. A fiber-optic cable tuner chip developed by the Heinrich Hertz Institute in Berlin also falls into this category. Although it was possible to demonstrate that the mass production of such a monolithic integrated optoelectronic chip (170 process steps) is technologically masterable, nevertheless it is still uncertain whether German manufacturers are able to produce on a large scale and at reasonable prices such new merchandise for the future "fiber-optic information superhighway."

Erlangen University together with Siemens studied optical interconnections by means of light-conducting plates and microoptical components for switching centers in telecommunications. Here a polished glass plate functions as the "backplane," i.e., as a substitute for conventional electrical connections. Optical in-and out-coupling was implemented by means of holographic coupling elements. Packing densities of up to 1000 channels per square centimeter were implemented for transmission distances of between a centimeter and a meter, and it was thereby also shown that free-space optical communication from user terminals permits substantially greater parallelism than electrical communication does.

Up to 1000 Channels per Square Meter

Daimler Benz AG [Inc.] developed a new kind of design for optical interconnections between several chips or chips and printed-circuit cards. Researchers placed optical glass elements having a 1- to 4-multimode-waveguide distribution structure closely over the electrical plane. These optoelectronic transducers transmit and receive light perpendicular to the substrate plane via micromirrors in the waveguides of the glass plate. The clock and data distribution in four chips with a bit transfer rate of one gigabit per second was demonstrated. Optical interconnections between several printed-circuit cards were tested with planar polymer waveguides on a backplane.

In this connection, Alcatel-SEL demonstrated a single-mode optical communication system for short distances in flexible polymer optical fiber ribbons. Siemens and IAF offered optoelectronic components having tailored optical, electrical and mechanical parameters. The positioning of the components with permissible deviation of one-micrometer is in accord with dynamic requirements. Four parallel-running channels each with a bit transfer rate of 622 megabits per second according to the ATM (Asynchronous Transfer Mode, the basis for the broadband ISDN [Integrated Services Digital Network]) principle were implemented in this way.

Based on these results, the second phase of the photonics program is focusing on specific system developments. For example, transmission systems having bit transfer rates of at first 40 and later 100 gigabits per second, optical amplifiers for wavelength regions that have not been able to be covered until now (the blue region of the spectrum), as well as optical switching networks for public switching, are goals. Massively parallel optical interconnection systems for high-performance computers are an additional emphasis.

However, the developable potential of optoelectronics depends strongly on the integration of components on a substrate. Similar development is taking place here as in the case of microelectronics 10 years ago, when it began with packing densities of a few thousand transistors on a chip. Today there are millions.

The trend toward monolithic integration is governed by demand. If this demand is sufficiently high, costs will drop sharply after the pattern of microelectronics. Of course, the development of microelectronics has also shown that new requirements first arise because of new low-cost products.

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Germany: KRC Designs Microcoils for Microsystem Technology

95WS0212A Frankfurt/Main FRANKFURTER
ZEITUNG/BLICK DURCH DIE WIRTSCHAFT
in German 2 Feb 95 p 8

[Article by "re": "Microsystem Technology Requires Microcoils. The Desired Coils Are Formed by Electroplating on a Sacrificial Wire"]

[FBIS Translated Text] Frankfurt—A process for making microcoils has been mastered at the Karlsruhe Research Center. Such coils having windings running around their longitudinal axis can play an important role in microsystem technology. Actuator coils, micromotors, microrectifiers, microrelays and also microensors are examples of applications for them.

In order to make them, a negative structure made of an electrically nonconducting material is put onto the surface of a thin sacrificial wire of the microcoil to be produced. The interspaces of the negative structure have the form of the microcoils to be produced and are filled by electroplating with a suitable metal like nickel, copper, silver or gold, for example, Forschungszentrum Karlsruhe GmbH [Karlsruhe Research Center, Ltd.] reports (Technology Transfer and Marketing, Pf. 3640, 76021 Karlsruhe. Fax: 07247-82 55 23). After this electroplating fabrication step, the negative structure is stripped off and the sacrificial wire is selectively etched away for the microcoil.

Microcoils made of nickel and having a coil length of five to eight centimeters, an inside diameter of 100 micrometers and between 500 and 1000 turns have already been able to be made thus far. The coil windings were around 40 micrometers wide and approximately 15 micrometers thick. Many shorter coils having a smaller number of turns—10 or 20 turns, for example—can be made from such coils by suitable isolating techniques. Microcoils having an inside diameter of 50 micrometers or even smaller can also be produced according to geometrical requirements. The Karlsruhe Research Center wants to develop this process further with cooperating partners, or to make it available to licensees.

Sweden: Adhesives Replace Soldering in Electronic Components

95WS0247B Frankfurt/Main FRANKFURTER
ZEITUNG/BLICK DURCH DIE WIRTSCHAFT
in German 6 Mar 95 p 10

[Article by "ghi": "Glueing Instead of Soldering in Electronics"]

[FBIS Translated Text] Frankfurt/Main—Electrically conducting glues can replace many soldered connection in electronics. This would already be desirable for reasons of workplace cleanliness and environmental protection, because the solder contains lead. In some electronics enterprises glueing methods have now been so far developed that they can be used in certain mass productions. Johan Liu of the Swedish Institute of Production Engineering Research (IVF, Argongatan 30, S-431 53 Molndal) recently expressed confidence about additional progress.

For more than four years the institute has been working on the development of electrically conducting polymer glues. Twelve companies from four countries participate in a joint project. One focal point for the development work is to assemble printed circuit boards using the technique of surface-mounted components (SMD technique). The glueing technique reduces the number of process steps, the scientists say. Processing temperatures can be lowered from more than 200°C to about 120° to 150° in comparison with soldering.

The circuit boards can be mounted more compactly, which could save up to about 15 percent of the space. The danger that connections may break under thermal and mechanical stress is considerably lower with glued parts than with soldered ones. Glueing on gold-coated boards represented the best solution in every respect.

If chips are to be fastened with their active side directly on a circuit board (flip-chip), glueing is cheaper than soldering although existing glues contain silver. In conclusion, Liu determines that glued connections are at least as good as soldered ones, and that this technique also permits assembly of larger components.

EU Report Compares European, Japanese, U.S. Research Spending*MI0703144795 Milan IL SOLE-24 ORE in Italian
20 Feb 95 p 23*

[FBIS Translated Text] How much are the European countries spending on scientific and technological research? They are still not spending much in comparison with the United States and Japan, their economic rivals, and, above all, the research efforts of the countries of the European Union are not producing brilliant technical and economic results. In other words, European scientific research is less productive than that of the United States or Japan.

This is the outcome of the first European report on scientific and technological indicators that was recently published by the Commission of the European Union. The goal of the study is to supply a systematic comparison between the European Union and the other industrial blocks, and to measure the impact of research and development activities on the cohesion of the European Community. There is no shortage of attention to the level of competitiveness that scientific activities manage to give to industry, which is defined as the "immaterial force" and is also able to give a breath of oxygen to employment.

The share of the gross national product which Europe reserves for research and development is tending to get closer to that of the United States and Japan, even if the distances remain significant. The Japanese are continuing to occupy the first place on the dais, but their rhythm of growth has slowed down, and their expenditure is not increasing regularly as it did in the 80's, the years when they overtook the United States. Although Europe is wearing the robes of Cinderella, with a level of expenditure of around 2 percent of the gross national product, compared with the 2.8 percent of Japan, it is managing not to accumulate further delays, a sign that the attempt made to stay in lane has not been made in vain.

The way in which the money is spent, however, is not satisfactory. This is shown, for example, by the number of patents registered by the European companies that do not manage to keep up with the rhythm of the competition. The number of United States patents granted to Japan is higher than that for Europe. At the same time the number of European patents granted to the Japanese is higher than that of each state of the old continent.

The various dynamics of industrial productivity also go under the report's magnifying glass. Under this profile, Europe, Japan, and the United States competed on an equal plane in the mid-seventies. Then the Japanese shot ahead, leaving the United States behind, and Europe trailing behind the group by itself. The only sector, in which the old continent, strong in its traditions, manages to compete with sufficient agility, is that of the automotive industry. A fact that is quite strange considering that the European Community research programs have never dedicated excessive financial attention to the transport sector. Only the fourth plan, that recently has been approved, ascribes a richer endowment of ECU's that does not, however, exceed 2 percent of the total funding.

In which sector does European research present itself most strongly? The most encouraging results are those coming from medical research, and in particular from the pharmaceutical and chemical sectors. On the contrary, the weakest areas are those of electronics, chemical and mechanical engineering, and information science. In the United States the picture is the opposite; the most dynamic sectors are those of engineering, electronics, and software. The most fragile, as far as research is concerned, are those of chemistry and pharmaceuticals. Japan, for its part, presents a fairly anomalous situation: Its limits in scientific research have been found to be in the computer sector, a sector in which, however, it enjoys great commercial strength.

The low intensity of research in the computer sector, that has been noted in Japan, is probably connected with the fact that their production is growing much faster than that of the United States and Europe. At the same time, the efforts that the United States and the European countries are dedicating to research in this field are often associated with weak production dynamics. This is how, what the Commission's report calls the "paradox of research" manifests itself: An intense scientific activity in a sector is not necessarily indicative of good industrial performance.

A look, finally, on what the Fifteen spend on scientific and technological research. Germany, France, and Britain invest more than 2 percent of the gross national product. Holland, Belgium, and Denmark are in an intermediate band that gravitates at around 1.8 percent. Below the average, there is the European Union's southern states patrol, made up of Italy, Spain, Portugal, and Greece.

EU Takes New Approach to European Limited Liability Companies*95WS0229A Frankfurt/Main FRANKFURTER
ZEITUNG/BLICK DURCH DIE WIRTSCHAFT
in German 2 Mar 95 p 2*

[Article by "now": "New Start for European Corporation?" "Interest of Industry. Co-Management Rights for Workers Continue To Be an Obstacle. Parliament Involved in Decision"]

[FBIS Translated Text] The project has slumbered for two decades in the file cabinets of the European Council of Ministers. In the past weeks and months, however, signs have multiplied that the regulation on the European Corporation Statute (Europa AG), originally proposed in 1970 by the European Commission, could become a topic of discussion again. The most recent signs from the economy indicate that primarily multinational companies perceive advantages in the intended legal form of Europa AG, adapted to trans-border activity. This is not the only reason that the EU Commission has included the Europa AG project in its working program for 1995. This project has been blocked for years in the deliberation of the Council of Ministers.

In previous discussions, the main obstacle has proven to be linking the planned regulation on the Europa AG Statute with a guideline on the co-management rights for employees. The Commission has placed the following three co-management choices up for discussion: the board of directors according to the German model, an internal

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personnel representative element such as that used in France, and one involving company or tariff agreements. The representatives of multinational companies noted that, according to the regulation on the European Workers' Council with a view toward the Europa AG, no additional social policy rule is necessary. This rule on the European Workers' Council was decided in September 1994 by eleven of the, at that time, twelve member states in accordance with the social protocol of the Maastricht Agreement without British participation.

The industry representatives appear to implicitly equate the regulations for the European Workers' Council with a "Co-Management Regulation." In fact, they involve only the rights of employees of companies with trans-border activities for information and a hearing, not, however, the classic "co-management rights." The European Parliament that will decide on the planned regulation for the Europa AG Statute on an equal footing with the governments stated clearly in January 1991 that it will only agree to Europa AG when equal models of co-management for workers are provided with it.

France: Defense Priorities for 1995-2000 Outlined

95WS0182A Paris AIR & COSMOS/AVIATION
INTERNATIONAL in French 6 Jan 95 p 43

[Article by Jacques Boyon: "Reaffirming Defense Priorities"; introductory paragraph in italics as published]

[FBIS Translated Text] Jacques Boyon, 60, is an RPR [Rally for the Republic] deputy for Ain and has been president of the National Assembly's Committee on Defense and Armed Forces since 1993.

Preparing for the future by giving our defense policy the resources it needs for responding to the "new international deal" was the task that the government set for itself when, last spring, it drew up a "white paper" on defense and submitted to Parliament a military planning law for 1995-2000 that was approved by almost every group in Parliament.

In a period of budget restrictions, the government demonstrated the priority it assigns to our country's defense by proposing to increase equipment credits by 0.5 percent per year, a figure that might rise to 1.5 percent beginning in 1998, depending on how the economic and financial situation develops.

Those figures mark a departure from the provisions of the five-year law for bringing public finance under control; they run counter to the general slowdown in defense efforts among our neighbors. Based on NATO's criteria, France devoted 34 percent of its budget to defense in 1993—pensions included—whereas the proportion fell to less than 20 percent in Great Britain, 15 percent in Germany, and 23 percent in the United States.

The budget just passed by Parliament sticks to the amount provided by the planning law for the first year. Everyone is pleased about that. Nothing would have dealt a more serious blow to the credibility of the law and the method chosen than failure to comply with it in its very first year, although the government had to present its proposal in a few roundabout ways to come up with the figure of 202.253 billion francs.

Today, however, that cautious satisfaction with the amount of money France is devoting to its defense must not be limited solely to an evaluation of our budget. The analysis must take into consideration the extraordinary challenge constituted by the thoroughgoing and rapid concentration of U.S. industry.

The examples provided by the alliance between Martin Marietta and Lockheed in the field of aeronautics and between Hughes and Raytheon in the field of missiles are a clear indication of the U.S. intention to build up large industrial groups which the French and the Europeans will not be able to resist for long if they remain dispersed.

On that point, it is essential to determine the content that should be given to so-called European preference in connection with armaments and decide on the method to be used in building it. The task is not an easy one. The French Government might find it useful to include that subject in the program for the French presidency of the European Union, which begins on 1 January 1995.

What are the priorities for the future? I see mainly four.

First, the ability to "project" power presupposes an emphasis on the means of military transport (the future transport aircraft, or ATF), the Naval Air Group, a fleet of multirole combat planes (the Rafale), and the development of precision missiles and weapons (the APTGD [long-range precision weapon] project just launched by the minister of defense) (see AIR & COSMOS/AVIATION INTERNATIONAL No. 1499).

Second, controlling increasingly complex situations requires autonomy as regards intelligence and the development of means of communication and command. The Helios satellite program will start giving us those means.

Third, the planning law reaffirms that deterrence remains at the center of France's defense. Its unchanged role remains that of defending vital interests with, as its body of doctrine, the thinking contained in the 1972 White Paper. This presupposes an adaptation of weapons and platforms without increasing the total volume of striking power. The legislative bill leaves it up to the next president of the republic to determine the components of our deterrent force and everything necessary for maintaining and strengthening its credibility, particularly in the matter of tests consistent with the negotiation of international treaties.

Fourth, research (which here comprises studies, development, and testing) must remain a priority at a time when funds are growing increasingly scarce and when European cooperation must be developed. We must make sure to maintain the competence of our researchers and the know-how of our technicians. Research—if it does not lead to the hypersophistication of our equipment and systems—is the best guarantee of the effectiveness of our weapons and of our export capabilities. But the state will not be able to do everything, and the manufacturers, harassed by competition, will no longer be able to finance their own research efforts as fully as in the past. Like the United States, therefore, France will have to reorganize and refocus its research structures and revise its financing methods.

In its military planning law, France has a reference tool for the years to come. But it is the implementation of that law

which will enable one to make a sure judgment regarding the new plan; everything will depend on the government's political will and Parliament's vigilance. And Parliament, for its part, will do all it can to ensure that the law as implemented is indeed the law that has just been passed so that we will be behind no one when we enter the 21st century.

France: Scientific Laboratories Join Forces on R&D Projects

BR0703151095 Paris *ELECTRONIQUE INTERNATIONAL* HEBDO in French 23 Feb 95 p 42

[Article by Rafael Font: "Grenoble Groups Laboratories on Joint R&D Projects"]

[FBIS Translated Text] The first set of research projects by the new group of INPG [Grenoble National Polytechnic Institute] laboratories has just been launched and includes high temperature components, sensors, microsystems, computer-assisted design, and power electronics.

Between now and next fall about 15 research projects bringing together researchers from a range of disciplines including microelectronics, optoelectronics, electric, automatic and signal processing, word and image engineering will be launched in Grenoble in the context of a "federation" of eight INPG laboratories.

This confederation, called Elesa (formerly MEGE-ATS), was officially founded last January under the framework of an agreement between the INPG [Grenoble National Polytechnic Institute] and CNRS [National Scientific Research Center]. The laboratories in question, which are attached to three Grenoble engineering schools (Enserg, Ensieg, and Ensimag), together group about 600 people, including about 280 doctorates. Each "lab" will keep its individual personality, and participation in Elesa will complement its normal work. "The research we will be carrying out will respond to the demands of industry itself," Elesa officials said. "It will be multidisciplinary research which, alone, will bring about more significant scientific progress," they added.

Elesa research projects will last two to three years. Professor Robert Perret, director of Elesa, hopes that industry will participate in at least one out of two projects. Negotiations are under way with several companies, notably in the microelectronics sector, but Mr. Perret preferred to remain circumspect on this.

About 20 New Projects a Year

At cruising speed, in two to three years time, about 20 new projects should be launched every year. The projects already committed or those expected within the next few months will focus on seven "federating axes": microelectronics, microsystems, electric vehicles, advanced automation for electric systems, digital modeling and simulation of acoustic, electronic or electromagnetic phenomena, signal and image, and communication and cognition.

The first projects will involve the exploration of a silicon carbide plate for high temperature components as well as the integration of magnetic sensors on command and power component protection cards. Another research

theme is the development of an energy collector for automobile batteries. Others will focus on clip feeding, commands for asynchronous engines, and man-machine communication.

The development of a microsystem for medical applications (this microsystem has to incorporate a microsensor, a microprocessor, a micro-operator and a communication interface), is one of the projects planned. Elesa will also work on the detection and location of faults at the level of command, measure, and power electronics of electric systems parts.

In the field of CAD [computer-assisted design], a project on frequency and temporal modeling of high frequency electronic circuits should be noted as well as another project on the modeling of physical phenomena at proximity in semiconductors. Finally, in signal, image, and word processing, Elesa researchers will be developing algorithms on the separation of sources to analyze and interpret mobile signals, an INPG official indicated.

France: Research Minister Takes Measures To Promote Life Sciences

BR2403140095 Paris *AFP SCIENCES* in French 9 Mar 95 p 1

[Unattributed article: "Research Minister Wants to Help the Living Sciences"]

[FBIS Translated Text] Fourteen scientific and technical committees comprising some 15 experts have been set up in the field of the life sciences, announced Mr. Francois Fillon, minister for higher education and research, on 9 March.

These committees will act as "scientific and evaluation watchdogs to see that activities are in keeping with international standards of excellence" notably in genetics, the biology of development and of reproduction, structural biology and pharmaco-chemistry, and the environmental sciences.

In concrete terms, seven major fields of action have been identified. Five concern fundamental measures on genetics, the biology of the development of reproduction and aging, structural biology and pharmaco-chemistry, environmental sciences (jointly with the environment minister), and the mechanisms of certain major pathologies. In addition to these there are two transversal measures touching on bio-information sciences and biotechnologies.

These committees will propose invitations to tender, evaluate research projects and ensure follow-up of activities "which are under way and those due to start in 1996," said Mr. Fillon, denying accusations that he was breaking up the activities already under way.

New courses of action have emerged now which need to be supported in 1996. In the food industry, for example, where three invitations to tender have been issued jointly by the agriculture and fisheries ministers within the framework of the "Food for Tomorrow" program, Mr. Fillon said.

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Genetics and particularly the large-scale sequencing of the genome is another sector which is being considered seriously. The minister indicated that he was waiting for the results of a report by experts on the possibility of bringing together the resources necessary for this sequencing which could be applied to both to certain model genomes and to part of the human genome.

"We have reached a turning point", Mr. Fillon added. "All experts agree that one of the main scientific challenges in the years to come will be the living sciences. The living sciences correspond to a countless number of applications today, in particular in the health field but also in the field of agriculture and the environment."

"Furthermore, these three fields are characterized by rapid biotechnological developments. The favorable processes which are opening up in the field are of interest both at the level of the shape and content of research. This is one of the most fruitful developments of the national consultation. These dynamic themes must be reflected by the dynamism of researchers, to exchanges of ideas, the mobility of men," the minister said once again.

Germany: R&D Budget Seen Focusing on Environmental Technologies

BR0803080495 Amsterdam *TECHNISCH WEEKBLAD*
in Dutch 22 Feb 95 p 6

[Report by Harris Tiddens: "Germany Earmarks 15 Billion Marks in R&D"]

[FBIS Translated Text] Bonn—Germany is a technological leader and plans to remain so. The budget of the new Federal Research and Technology Ministry amounts to over 15 billion German marks [DM]. The 2.7-percent increase outstrips that of other ministries.

For the first time in German R&D policy Federal Minister Juergen Ruetters bets on "networking." The new approach is characterized by a thorough reorganization of the ministry and subsidizing conditions, whereby programs need to entail "system innovations." Completely new is the "Construction and Living" program. It focuses not only on energy saving and passive use of solar energy. In view of the catastrophic situation in eastern Germany the development of new construction and renovation techniques will get much attention.

"Production 2000" is a DM450-million program concentrating on the innovation of production systems. Major topics are integrated environmental protection, recycling technology, and production logistics. Other "networking programs" are "new materials" and "traffic systems and mobility."

For the first time German R&D policy does not focus on "supertechnologies" such as the "magnetic levitation" but rather on primary projects. These are broadly oriented pilot projects in which public authorities, scientific organizations, and industry cooperate.

The emphasis will be on the development of integrated environmental technologies and energy technologies aiming to reduce carbon dioxide production and energy consumption. For research into renewable energy sources

the ministry has allocated DM330 million for this year. Over the coming years the emphasis will increasingly be on the development of photovoltaic systems. Research into risk-free nuclear reactors is continuing slowly. Other spearhead technologies are information and communication technologies which, with DM922 million at their disposal, have been allocated the largest part. The medical sector as usual also uses up a large amount of money.

Germany: Experts Demand New National Space Program

BR2403134895 Paris *AFP SCIENCES* in French
16 Mar 95 p 7

[Unattributed article: "New National Space Program Urged in Germany"]

[FBIS Translated Text] German space specialists sent a letter to German Chancellor Helmut Kohl calling for the organization of a new national space program, as was revealed in Bonn on 11 March.

In the letter, which was also sent to Research Minister Juergen Ruetters, the 4,000 members of the DGLR [German Air and Space Society] demanded a round table with all the parties involved, including scientists and industry, to define the major future direction of research in Germany. They also drew Mr. Kohl's attention to what they perceived as a weakness in national space activities in relation to Bonn's financial contribution to the ESA [European Space Agency].

According to DGLR President Mr. Hans Rath, only 20 percent of the government's space budget (1.6 billion German marks) is allocated to national projects. "Ideas of great worth and small programs which can contribute to various developments in space research have little chance of succeeding in Germany."

He explained that R-Alpha, the European module for the international space station Columbus, will be an "empty tin can" if it is not accompanied by a research project by major research schools or institutions. "German space research will lose its specificity in the future," he said. This will jeopardize a highly technical sector and will have important repercussions on German competitiveness, he added.

German Minister Views Tasks of New Technology Council

AU2203215395 Duesseldorf *HANDELSBLATT*
in German 22 Mar 95 p 4

["fdo" report: "Ruetters: Technology Council To Give Important Stimuli"]

[FBIS Translated Text] Bonn, 21 March—Future Minister Juergen Ruetters (Christian Democratic Union) expects the new Council for "Research, Technology and Science" to provide important stimuli for a future-oriented policy in Germany. The minister noted this in an interview with *HANDELSBLATT*.

The establishment of a Technology Council was decided already last year. Because of certain reservations against

such an institution and because of the forthcoming election campaign, the project was, however, delayed repeatedly.

Following the appointment of the Council members, the Technology Council will finally meet for its constituting session, chaired by the chancellor, on Wednesday [22 March].

According to Ruettgers, high-ranking representatives of business, politics, trade unions and science are represented on the Council. In talks and discussions they are supposed to work out "future-oriented options for action" for Germany as a business location.

This is no competition for his ministry but an important and necessary supplement, the minister stressed. It is an attempt to hold a dialogue with relevant groups in order to define further actions in Germany. Ruettgers stressed that innovation in Germany cannot just be implemented by the government. Even though research subsidies are an important thing, "the right minds" are at least as important as "accounts."

The Technology Council, in which renowned business representatives, such as Heinrich von Pierer, chairman of the Siemens AG board of directors, or Bernd Pischetsrieder, chairman of the BMW board of directors, has the know-how necessary for broaching questions, which are decisive for the future, and provide corresponding suggestions.

According to Ruettgers, the fact that the chancellor himself is dealing with this matter shows how important the government considers future policy to be. Ruettgers does not consider the argument that the Technology Council is another step toward a republic of councils valid. Quite the contrary: He sees the council also as a place of dialogue. This is demonstrated by the planned *modus operandi*: The council is to work out concepts and questions on certain important issues. These will then be detailed and examined thoroughly in the technical departments of the responsible ministries. The results are then to be presented to the council again. The goal is to have trade unions, politicians, industry, and science pull together when certain important future areas are involved.

As an introductory focus, Ruettgers has suggested the issue "information society" to the council. Other issues for the next months will be worked out and suggested by the council itself on the basis of its first meeting.

Ruettgers confirmed that he will become the council's manager after the first meeting. The concrete work, however, will take place in close coordination with the responsible ministries, such as the Economics Ministry and the Post Ministry.

Sweden: Expert Views Cuts in Basic Technical Research

95WS0224A Stockholm NY TEKNIK in Swedish
19 Jan 95 p 13

[Interview with Anders Flodstrom, principal secretary of the Council on Technical Sciences, TFR, by Sus Andersson: "Technology Researcher Worried When Math Must Give Way"]

[FBIS Translated Text] Basic technical research must give way in this year's national budget. This is what Anders Flodstrom, who is principal secretary of the Council on Technical Sciences, TFR, says. He worries that directed research will take over.

[Andersson] How is technical research affected by the TFR losing a few million in this year's budget?

[Flodstrom] These are rather marginal cuts compared to last year's funding.

What is a bigger problem is that when the TFR was established the government said that in the long term we would reach the same level as the NFR, the Research Council for Natural Sciences, which supports basic natural science research. Today, that research council has about twice as much funding as our 260 million.

[Andersson] How much extra money had you expected this year?

[Flodstrom] At the rate of development intended from the beginning we would have had approximately another 100 million for the coming year.

Now we are deeply concerned that the balance between basic technical research and more applied research is shifted away from basic research.

What we can glimpse today is that the contributions from research foundations are going toward directed research. And the EU [European Union] projects must clearly involve industrial participation.

[Andersson] Does that matter?

[Flodstrom] I worry about two things. If we lose that balance, it will be more difficult for us to compete with international research. Comparisons may be made with the national teams in ice hockey or soccer—if they are to do well in the world championship it affects all the other series as well.

I also worry about the quality of training for civil engineers and PhDs. The institutes of technology are to provide both education, basic research and applied research. Now there is a risk that they will more resemble research institutes for industry.

[Andersson] Isn't it good to have the needs of industry directly influence the education of engineers?

[Flodstrom] Sure, it is good to have a dialogue between industry and the institutions of higher education. But the companies can have very specific requirements. A narrower education can mean that even major companies risk losing their flexibility and long-range competence—for example in the electronics industry, where the development goes so incredibly fast from one generation to the next.

With directed research alone, you work with much too short a horizon.

[Andersson] How far ahead to you aim?

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[Flodstrom] Most of what we support is carried out by PhD candidates. Those projects are often for four-five years and are parts of programs that run for a period of up to 10 years.

[Andersson] Which areas will now have to go?

[Flodstrom] One field is production technology, where there is a great need for technical renewal. The research that is underway is quite close to application.

Another field is applied mathematics, working with, among other things, computer simulations within various engineering disciplines.

[Andersson] Will those efforts now be scrapped?

[Flodstrom] No, they will still be prioritized, but we will not be able to do as much.

What we are happy about is that there will be additional money for high-performance computer systems, a council which is to supply researchers at universities and institutions of higher education with sensible computer resources.

Netherlands: Technology Programs To Receive Less Government Funding

BR0803105595 *The Hague ECONOMISCHE ZAKEN in Dutch 17 Feb 95 p 9*

[Unattributed report: "Economic Affairs' Technology Programs: 45 Million Guilders Less Than in 1994"]

[FBIS Translated Excerpt] In a letter to the Second Chamber, Economic Affairs Minister Wijers explained the four business-oriented technology programs for 1995. Their aim is to stimulate companies' R&D in the fields of biotechnology, materials, environmental, and information technologies. In addition, there will be supporting activities intended to reinforce the effects of the R&D funds.

The programs are a continuation of those from previous years. This year a total of 101 million guilders [fl] will be available. This is fl45 million less than in 1994, due to cutbacks in the government accord. When finalizing the programs it has been decided to maintain the environmental technology R&D budget at the same level as before and to spare the innovative small- and medium-sized enterprises (SME's) as much as possible. The Stimulation Program for Business-Oriented Technology (PBTS) allows companies to obtain funds for their research projects. Independent experts will assess the projects on their technological innovation and economic outlook and classify them according to their quality. As in 1994, much attention will be given in 1995 to collaboration: Projects in which companies work either together or with research institutions will have a greater chance of receiving funds. The information technology (IT) regulation will contain three programs in 1995: "Contracting to Research Institutions," "Branch Applications," and "Telematics." Research, pilot, and branch projects can be subsidized within this framework. [passage omitted]

Gratifying

In 1994 a total of 172 PBTS applications were approved. What was gratifying was that 40 percent of the applications was submitted by companies making such an application for the first time. The SME's were also able to find their way to the PBTS. Fifty-three percent of the successful applications came from companies with fewer than 200 employees. Over 90 percent of the successful applications had some form of cooperation between different companies, or between companies and the knowledge infrastructure. Because tenders for the 1994 IT regulation were submitted late in the year, only details concerning the applications are available. In total 423 applications were made. Of these, 67 percent came from companies with fewer than 200 employees. Table

Funding is divided as follows:

	Biotechnology	Materials Technology	Environmental Technology	Information Technology
R&D funding	14	21	26	21.5
Other activities	0.4	3.6	10.5	4
Total	14.4	24.6	36.5	25.5

Switzerland Looking to Join 4th Framework Program

BR0203152695 *Paris EUROPEAN BIOTECHNOLOGY NEWS in English 17 Feb 95 p 8*

[Unattributed, untitled article under "Short Notes" rubric]

[FBIS Transcribed Text] Switzerland is negotiating with the European Commission so that its scientists could play a more active role in the fourth framework programme. The country that recently voted against joining the European Economic Area (thus losing its automatic right to participate fully in the FP) now wants to become an associate member of the programme at a cost of \$155 million per year. Such a move would give Swiss scientists the right to have access to the results of all framework research projects and the right to initiate and lead research projects with only one EU partner.

Reorganization in Italian Defense Sector

95WS0238A *Paris AIR & COSMOS/AVIATION INTERNATIONAL in French 24 Feb 95 p 12*

[Article by Jean de Galard: "Reorganization of Alenia Management"]

[FBIS Translated Text] A short communique reported in the Italian newspapers on Tuesday 21 February announced that Fabiano Fabiani, administrator delegate of the Finmeccanica group, has decided as part of the ongoing reorganization of the Italian defense sector to name Giorgio Zappa sole head of Alenia. Since 17 May 1993, Zappa, 50, has been general manager for industrial management, a position he shared with Paolo Micheletta. Zappa will replace both Enrico Gimelli and Fausto Cereti, themselves co-leaders of Alenia since 1993, when the enterprise was taken over by Finmeccanica. Gimelli, 58,

moves over to Finmeccanica to become the group's adviser for "all defense industry affairs"; Cereti, 63, stays at Alenia, where he "will manage international relations and alliance policy in all aeronautical matters." Giorgio Zappa joined IRI [Institute for the Reconstruction of Industry, an Italian state holding company] 21 years ago. Henceforth, Paolo Micheletta will be Alenia's one and only general manager. His nomination appears to herald a new reorganization of Alenia, which is in serious financial trouble with debts amounting to three times its equity capital... The same communique notes that the net profits of FIAT (which controls Finmeccanica) came to 5 billion lire (19 million French francs) last year, versus 6.8 billion lire (28 million francs) in 1993.

Prospects for Italian, Hungarian S&T Cooperation Reported

BR2703082295 Rome UNIVERSITA RICERCA
in Italian No 11-12, 1994 pp 34-36

[Unattributed article: "Cooperation Between Italy and Hungary: Status and Prospects"]

[FBIS Translated Excerpt] [passage omitted] Bilateral and multilateral S&T cooperation between Italy and Hungary is governed by specific protocols and memorandums of understanding briefly summarized here below together with their contents.

The intergovernmental protocol for S&T cooperation jointly promoted by the General Directorate for Cultural Relations of the Ministry of Foreign Affairs and by OMFB, is periodically updated in its projects; the last revision dates back to 1993.

The protocol aims to facilitate the transfer of knowledge through projects to be jointly carried out by governmental bodies, institutions, and companies of the two countries. These projects are directly supported through the mobility of researchers and experts. To date, 14 projects are ongoing and new cooperation areas in different scientific disciplines (astronomy, chemistry, mathematics, biology, medicine, and environment) are being studied.

An important complementary instrument envisaged by the protocol is the promotion and organization of symposia, seminars, and specialized conferences on subjects that are of utmost importance at scientific and technology transfer levels. Three events can be mentioned in this context respectively focusing on the rational use of energy (Budapest, 1992); the impact of new technologies in the textile industry (Budapest, 1994) and in that of ceramic materials for civil and industrial applications (Balatonfured, 1994), and a fourth one, i.e., a symposium on spectrochemistry scheduled for 1995.

Besides its specific contents, the protocol is structured as a sort of a more general "framework agreement." It usually lists the main cooperation plans agreed upon and managed in complete autonomy by bodies and institutions in the two countries.

Conventions and specific agreements are underwritten bilaterally. Among these, the scientific cooperation agreement between the CNR [National Research Council] and the Hungarian Academy of Sciences (that provides for

joint research activities and numerous exchange programs for Hungarian researchers in Italy and viceversa) and the agreements reached by different universities in the two countries are particularly noteworthy.

In this context, the relations recently established between the University of Bologna and the Ministry of Foreign Affairs on one side, and between the Ministry of Culture and the Soros Foundation on the other, should be mentioned. These aim to establish the conditions required to reopen the prestigious "Hungarian College" at Bologna University, whose role—as planned by the parties—will also be to pursue scientific cooperation as an element integrating the more general cultural relations between the two countries.

Specific multilateral agreements have been reached within the framework of the "Central European Initiative" (IN.C.E.) which provides for researches, feasibility studies, and demonstration projects in different sectors, many of which (particularly those referable to the "Science & Technology," "Energy," and "Environment" teams) have relevant R&D contents.

IN.C.E. assigns a relevant role to Italy and Hungary right in scientific and technological research. Despite the objective difficulties (most of which are related to the lack of funds for the agreed projects, as originally provided by the law 212/92), a few important actions and surveys have been carried out within the "Science & Technology" group (under the Italian chairmanship) and were basically confirmed in the last plenary meeting of the group (Trieste, July 1994), i.e.:

- Intensification of the Italian and Hungarian activities in support of a direct participation of IN.C.E.'s member states in the major scientific and technological organizations sponsored within and outside the EEC (such as EUREKA [European Research Coordination Agency], COST [Cooperation in Scientific and Technical Research], SPRINT [Strategic Program for Innovation and Technology Transfer], CERN [European Nuclear Research Center], Meteorological Center, etc.).
- The confirmation of a general interest in significant joint projects such as "Excellence Centers and Physics of the Matter," "Center for the Technological Transfer," "Earth Sciences," "Meteorology," "Space," "Industrial Technologies and Automation," "Parallel Computing."
- The organization of symposia and specialized conferences as well as stages for researchers at important Italian institutes (INFN [National Institute of Nuclear Physics], IRI [Institute for the Reconstruction of Industry], INFN [National Institute of the Physics of the Matter], Elettra Synchrotron).

A lot of attention must be paid so that the uncertainties about the future of IN.C.E. do not waste the precious work carried out so far: Whatever may be the destiny of the initiative, the contents and prospects of the completed projects must be adequately exploited. An important point of our cooperation policy with IN.C.E.'s member states—and with Hungary in the first place—must be the exploitation of the so-called "Trieste System" with all its scientific and technological elements.

[passage omitted]

Netherlands: Researchers Develop Production Process for Superconducting Ceramic Wire

BR1703125495 Paris AFP SCIENCES in French
2 March 95 p 14

[Unattributed article: "Dutch Researchers Open the Way for Superconductive Ceramic Wire"]

[FBIS Translated Text] Dutch researchers announced on 1 March that they had developed a procedure opening the way for a superconductor ceramic wire. These kinds of wires would be mainly used "for the distribution of electricity from central generating stations," explained Peter Kes of Leyden University who is in charge of the project.

They should also allow significant progress to be made in medical applications in magnetic resonance ("providing practitioners with films instead of static images") and stimulate the development of current controllers based on superconductor technologies and aiming to reduce risks of damage due to short circuits.

According to Professor Kes, the first superconductor ceramic wire should see the light of day "within one year." Several foreign manufacturers have already expressed their interest in the Dutch process. They include the

German groups Hoeschst, Siemens and Vakuumschmelze as well as American Superconductors.

The production of this kind of wire was not considered profitable when scientists noticed, around 1986, that ceramic materials lost their superconductivity when crossed by a high-intensity electric current, therefore limiting applications. Up until now, only small switches and detectors, which do not require high currents, are fitted with them.

The Dutch patented procedure has just changed this situation and allows ceramic materials to be superconductive in all circumstances. To achieve this, researchers bombarded an alloy of bismuth, strontium, calcium, and copper with titanium ions thereby creating impurities. "The secret is in the quantity of impurities. Contrary to our expectations, 1 percent was enough to transform the basic alloy into a powerful superconductor," Professor Kes said.

The research, which is funded by the Dutch Economics Ministry, was led jointly by Leyden and Delft Universities as well as by the Foundation for Fundamental Research on Matter (FOM).

EU Proposal Advocates Open Network Provision in Telecommunications*95WS0220D Munich COMPUTERWOCHE in German 17 Feb 95 p 24*

[Article from "vwd" information service: "Brussels Wants to Make Telephone Service a Civil Right"; "EU Proposal for Open Network Access"]

[FBIS Translated Text] Brussels—The EU Commission has presented draft legislation for the introduction of open network access (Open Network Provision or ONP) with voice telephone service. The planned directive is to guarantee future open and efficient access to Telecom services in the Community as well as the provision of a lowest bid.

The proposal goes back to a draft already submitted in September 1992 in the Council and Parliament and contains the ONP conditions for access to fixed public telephone networks and services as well as for their use. Because of still unresolved process technology questions, however, this bill was rejected by the European Parliament in July 1994 after the Maastricht Treaty took effect.

According to statements coming from Commission circles in Brussels, the EU institutions have in the meantime agreed to take up relevant consultation procedures again by 1996 at the latest. An agreement in principle by Council and Parliament is already expected for the second half of 1995. Martin Bangemann, the commissioner in charge, took this opportunity to emphasize the social and economic importance of voice telephone service. Thus, according to Bangemann, every citizen should have the right "to share in this service."

In conformance with the principle of non-discrimination, voice telephone service must of course, as Brussels says, be offered on an equal basis to all users. This applies to technical access; rates; service quality, delivery period and the fair distribution of capacity with regard to under-servicing; repair times and the availability of network and customer specific information—here, the relevant data protection rights must be observed.

EU Computer Networks Set For Expansion*BR1703151295 Swanley NETWORK EUROPE in English Mar 95 pp 31-32*

[Article by Matt Frere: "A Nervous Reaction to European Networks"]

[FBIS Transcribed Text] The problems posed for the public sector in Europe in creating effective pan-European administrative systems are manifold. There are technical challenges: the continuing technical difficulty of communicating successfully over borders between different European countries; the complexity of integrating a large number of different users each with a sizeable installed base equipped with different hardware and software.

And there are the managerial and political problems: the complexity of dealing with 15, and in the future many more, different national traditions and cultures; and ten different languages; but most serious of all is the political limit national governments are willing to put on cooperation.

One of the first pan-European administrative systems was the Schengen Information System [SIS] to link European police forces.

The software incompatibility that hit the ill-fated SIS project is all too typical of the high-tech Euro-projects of the past—where no one was willing to cede the least control.

This is not the way, says Philippe Wauters of Trans-European Information Systems (TEIS), a joint venture between Siemens-Nixdorf, Olivetti and Bull aimed at promoting pan-European networks. He points out that "police affairs is not an area in the competence of the Commission of the European Community." The Schengen agreement to scrap border controls and replace them with the sophisticated police information system, SIS, was the "initiative by certain member states" and thus was a purely inter-governmental arrangement.

The SIS was developed with one central team in Strasbourg developing a common interlinking module, but, says Wauters, "each national administration developed their own national system as a completely different project." The complexities that have marred the project were "not technical, but managerial," he says. "There was only local responsibility, but no one took responsibility for the whole thing."

His conclusion is that "if you do it like Schengen, you can't win."

But like it or not national administrations are loathe to give up too much control to the Commission in Brussels. At the same time pan-European administrative systems are vital if the single market is to work. VAT systems are vital to maintain the tax system. Exchange of statistics, customs information, social welfare data, medical and health information, environmental data, and so on will all become commonplace in a Europe without borders.

The European Commission is funding a series of pan-European administrative projects and has tried to find a solution to the conflict. It has set up a scheme where "national server pilot projects," NSPPs, allow the specification of a common communications and information exchange (e-mail, and so forth) platform. National administrations then only have to accept data from and pass it to the national server(s).

"There is one central customer, the Commission, and one provider, TEIS," says Wauters. "We are creating an instrument for cooperation between national governments and the Commission."

The NSPP will allow individual nations to have training material and the graphical user interface in their own language(s).

"The main justification for the NSPP is that our customer is the Commission, while their customers are the national governments," he says. For example, "Agriculture is controlled by the national governments, but the Commission needs a view of what is happening for administering the Common Agricultural Policy."

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Information has to be shared, but "national administrations need their autonomy. The idea of the Commission is to put in place guidelines for all administrative system architectures to ensure interoperability and define clear distribution of responsibility between member states and the Commission, and member states can develop their own systems."

"So far 20 areas have been defined where national administrations have to work together and have to work with the Commission," say Wauters. The five initial pilot NSPPs have been in operation since 1991 or 1992. From the beginning of 1995 that number should have risen to 15, but due to teething troubles the planned start date is now March 1995. Wauters says that "the jury is still out on the user interface," indicating that consensus can still be difficult to achieve.

When the links go live 40 different administrative organizations in various sectors and various countries will link through their NSPP (in the longer run there is no reason why a member state should not have more than one NSPP). There will also be Directorate servers at the Commission and a Central server, run by TEIS to handle network and system management.

Communication will initially be by X25 directed through the Infonet network. But, says Wauters, ISDN, frame relay, SMDS and ATM will all be available in the future. "We started with what is available now," he says.

The system is "almost ready to go into operation," says Wauters. Later this year the total number of NSPPs will be expanded to 15 to include the new member states, Austria, Finland and Sweden.

Explanatory Sidebar: A Common Specification for National Platforms

The National Server Pilot Project, NSPP, is the solution adopted by the Commission for the pan-European backbone connecting the European public authorities and the Commission. The project is funded within the framework of the European Union's Interchange of Data between Administrations, IDA, programme.

The main functions of the project are: the exchange of sectoral data; interpersonal mailing for public authorities; pan-European directory services for public authorities; central network and server administrations, directory administration and help desk facilities.

Every national server will support at least 25 interpersonal message user agents, UAs, an administrative UA, and at least one UA for application to applications communications. The platform will support the following functions: e-mail 88; integration of X500 services; migration of automatic UAs to X/Open APIs; central administration; windows based remote UAs; and user training.

The configuration can be based on Siemens, Bull or Olivetti hardware running UNIX in compliance with X/Open, XPG3. LAN interfaces are available to ethernet, token ring and WAN interfaces to X25.

Wauters says that "as a UNIX based communication platform between member state administration systems

and the Commission's Directorate server, the NSPP national server offers dual communication facilities. Local connection with the member state administration when such possibilities are available, or via emulation of proprietary procedures if needed. Alternatively, OSI communication with the Commission systems."

The common system software platform, CSSP, developed by Marben provides the glue between the different possibilities available from the system.

IT Awards By EU Promise High Market Potential For New Products

95WS0220C Munich *COMPUTERWOCHE* in German
17 Feb 95 p 10

[Article by "CW": "European Award for Most Interesting IT Products"]

[FBIS Translated Text] Munich—Companies or organizations receiving the 1995 European IT prizes win a lot of money. Chosen are those "new products with a high quotient of information technology and market potential," of which at least one prototype exists and which came on the market in 1994 or later.

The Information Technology European Awards (Itea '95) are given by the European Commission DG III and the European Council of Engineering Colleges. Organizations of the most varied types have up to the end of April of this year to put in their applications as long as they have their headquarters within the European Union (EU) or in an EFTA [European Free Trade Association] country. Three cash prizes in the amount of ECU200,000 and 20 at ECU5,000 are there for the winning; in addition, the most interesting entries are presented publicly.

Applications in Germany can be turned in at the Fast Research Institute for Applied Software Technology in Munich (phone: 089/92 00 47 40) or at the Cologne DLR German Aerospace Research Institute - Information Center for European Union Programmes (phone: 022 03/601 34 33).

France: ADSL Technology Experiments on Telephone Network Ruled Out

BR2303151295 Paris *ELECTRONIQUE INTERNATIONAL* HEBDO in French 9 Mar 95 p 15

[Frederic Fassot report: "No Telephone on Cable Networks—No Video on Telephone Networks"]

[FBIS Translated Text] The government has decided. There is no question of authorizing experiments on the information superhighways that would require exceptions to be made to the current regulations governing telecommunications. In other words, the projects mooted by Lyonnaise Communications and the Compagnie Generale de Videocommunications (CGV) which planned, among other things, to offer telephone services on their cable TV networks in Annecy and Nice respectively, have not been selected. It appears that the government did not want to take the risk of turning France Telecom staff against it since they are already very concerned by the perspective of the liberalization of the telecommunications market as of 1 January 1998. However, it is a shame to see industrial

groups being refused the chance of carrying out life-sized tests on the technical and commercial potential of a service that will be legal in less than three years, not least because in December the public authorities were very much in favor of granting derogation licenses so that the field of experimentation could be as wide as possible.

Proposals for Standardization in Six Months

This field will narrow even more since France Telecom's project looking to test out ADSL (asymmetric digital subscriber line) technology on its telephone network for the transmission of TV programs was not selected either. We still cannot understand whether the project was not authorized because it needs special derogation from the existing regulations, as for telephone on cable, or because the financial package was incomplete.

Of the 635 projects for experimental infrastructures (one third of all projects) and services (two thirds) submitted to the government in response to its call for proposals, just 49 projects will receive the "public interest experiment" label once the project authors can prove they have the necessary financial backing. Another 218 projects that do meet the criteria laid down in the call for tender (with regard to technical innovation, user-participation in the project, the technical, financial, and industrial realism and viability of the project, and its interest for society at large) have been put on hold. They cannot be implemented directly either because they are not fully financed or because they pose legal problems (they do not comply with the regulations). A budget of 500 million French francs [Fr] over two years under the heading of research and innovation aid from the Research and Industry Ministries and the National Agency for Research Enhancement [Anvar] was decided on to complete the funding of these projects. They will be re-examined in six months time—after the presidential elections—when a new interministerial committee meets. At this time proposals concerning the standardization of terminals for access to the information superhighways should be announced. Working groups will be set up between the various prime contractors for the selected projects so as to launch these standardization works before the summer.

With nine of its projects selected, France Telecom is the main winner of this call for tender. The public operator, which is due to make a detailed presentation of its projects today, is committed to accelerating the planned rate of fiber optical cable laying ("almost" to the subscriber's door). After a validation phase in the framework of the Dora program (for optical distribution in the access network) France Telecom will start to lay fiber optic lines to the door of apartment blocks for 50,000 to 100,000 households over the next two years. SFR [French Radio Technology Company] has also been selected for a mobile services project using personal identification numbers. A number of projects from Bull, Digital, Philips, and SGS-Thomson have also been selected.

France: Information Superhighway Project Setback Reported

95WS0228A Paris LE MONDE in French 2 Mar 95 p 17

[Article by Caroline Monnot: "Information Superhighway Projects Will Not Precipitate Telephone Deregulation"—first paragraph is LE MONDE introduction]

[FBIS Translated Text] Out of the 635 applications submitted, 49 have already been accepted by the authorities. The interministerial committee on information superhighways met on Tuesday 28 February. Generale des Eaux and Lyonnaise, two companies that hoped to sell telephone service over cable-TV lines, are not among the applicants whose submissions were accepted right away for pilot projects. Some of the unsuccessful applications will be reviewed again in 6 months. France Telecom will go ahead with a pilot project involving 50,000 Parisian households.

Industry minister Jose Rossi made public on Tuesday 28 February the results of a call for bids issued a little over 3 months ago with a view to eliciting proposals—both for services and for infrastructure—for future information superhighways. The winners were formally picked earlier in the day by an interministerial committee, which decided to allocate 500 million French francs [Fr] over a 2-year period (Fr300 million in major innovative projects from the budget of the General Directorate of Strategic Industries, Fr200 million out of the ANVAR [National Agency for Promotion of Research] budget).

A curious feature of the exercise was the fate suffered by Generale and Lyonnaise, which had hoped via their pilot platform projects to sell telephone service over their cable lines. Lyonnaise hoped to provide it as part of a cluster of services being tested in Annecy. Generale was going to conduct its testing in Nice. These two applicants hoped also to use the opportunity of information superhighway experimentation to get exemptions and provoke some initial deregulation of telephone service in France. The authorities considered this idea. And they rejected it. For now.

Neither Lyonnaise's nor Generale's submission were among the 49 out of 635 accepted in the first round. However, they are among 218 others that were ranked in the second category. Their files must be re-examined, either because the financing is still to be specified or because they are incompatible with the current regulatory regime.

At any rate the cable operators missed their first chance and must now bide their time until the next interministerial committee meeting on the subject. That review session, Mr. Rossi explained, will be convoked by the new government after the elections, in 6 months. Also, 287 applications that were "not at all responsive to the criteria set down" are going to require further modification. And 80 others are "just not in the ball park." They were scrapped.

There was some delay in announcing the decision; originally, it was intended for the news to be released before the 25-26 February G-7 meeting on information superhighways. "It might make sense to wait until after the results of that summit are known before making our selections final," government sources were saying last week. The summit's clearly deregulationist tone does not seem to have spurred the French Government to hurl itself abruptly in that direction.

Disappointed, General Videocommunications Company, CGV, a specialized subsidiary of Generale des Eaux, issued a statement "regretting" the decision. Lyonnaise

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Communication for its part said it is "hopeful" and pleased that its project was placed "in a promising category."

The lucky sponsors of the 49 projects that won immediate approval are a very diverse group. Among them are private entrepreneurs, numerous local government entities, and a scattering of government agencies, though it had been hoped many more of these latter would participate, to create a snowball effect. "The modest scale of actions contemplated by the agencies necessitates more structured action on the part of the state," Mr. Rossi commented. To be certified as "experiments in the public interest," all their commitments—and the financing for the projects—will have to be confirmed.

France Telecom for its part has played the game, though earlier it had voiced strong reservations to the proposals in the Thery report, which called for extending optical fiber lines direct to subscribers, i.e., fiberizing the local connections linking each subscriber to the main network. Mr. Thery had suggested a vast plan of "bringing fiber cable to every doorstep," with a view to connecting every household by the year 2015. Nevertheless, France Telecom is moving ahead "on a trial basis" to connect 50,000 households, most probably all in Paris. By contrast, the big manufacturers—builders of terminals and [communications] infrastructure such as Thomson and Alcatel—seem interested only in playing a minor role. That is more disturbing.

German Views, Pilot Projects for Information Superhighway

Minister Ruettgers on Policy

95WS0245A Duesseldorf WIRTSCHAFTSWOCHE
in German 23 Feb 95 p 93

[Interview with Future Minister Juergen Ruettgers by Burkhard Boendel: "Broad Application"]

[FBIS Translated Text]

[Boendel] Minister, what is your personal e-mail address?

[Ruettgers] Information directed to me will reach me at MinisterBMBF.BUND400.DE. or Juergen. RuettgersBMBF.BUND400.DE.

[Boendel] When are you going to start an electronic dialogue about this with interested citizens?

[Ruettgers] The BMBF [Federal Ministry for Education and Research] is the first federal ministry to offer information via the German Research Network that can be called up through Internet. Questions or requests for material are also processed immediately, of course. The Internet access to BMBF information will be set up under the address <http://www.dfn.de/bmbf>.

[Boendel] Good, you have the e-mail addresses, but the Federal Government does not have much more than that to show in the discussion about the information superhighway.

[Ruettgers] That is not true! During its EU presidency the Federal Government made this theme its focal point. My

ministry promotes a series of pilot projects for telecooperation. For the current year the federal departments in charge are preparing a review of the current situation and perspectives under the title of Info-2000 as a further incentive for public discussion and economic innovation.

[Boendel] As future minister, how do you intend to strengthen the economic base for information technologies in Germany?

[Ruettgers] The discussions about utilizing information technologies in science, education and administration are in full swing and have already led to a series of pilot projects. Because of its cross-section effect, information technology will become the principal technology of the 21st Century in all the areas of the economy and life of modern society. Even today more computers are bought annually than cars, and in a few years the number of jobs in the information technology industry will exceed those of the auto industry. I hope that impulses from discussion rounds, consensus talks and support measures by the BMBF will help make a broad contribution.

[Boendel] So far only commercial considerations exist for utilizing the information superhighway. How about some social policy visions, for a change?

[Ruettgers] We are discussing the development prospects for the information society at all levels. It is clear to me that the social consequences will play at least as great a role as the economic ones. We want to continue to support and accompany this public opinion-forming process.

Various Pilot Projects Planned

95WS0245B Duesseldorf WIRTSCHAFTSWOCHE
in German 23 Feb 95 pp 93-96

[Article by Markus Schnurpfeil: "Not Coordinated"]

[FBIS Translated Text] When the economics minister of Baden-Wuerttemberg, Dieter Spoeri, reports on the future he can scarcely be stopped. By means of fiberoptics-supported information superhighways it will be possible, the SPD [Social Democratic Party] politician agrees with other members of his guild, "to alter life and work fundamentally in the information society." So it is natural that the dynamic minister wants to make the Baden-Wuerttemberg citizens the first people excited about multimedia: "This land can be the driving force for all of Europe."

With such bold words Spoeri praises the multimedia pilot project that is to be started this summer in the Swabian metropolis of Stuttgart. With a project that costs 100 million German marks [DM] the protagonists want to thrust 4,000 households into a beautiful new world in this small land: Using their personal computers participants can call up feature, documentary and special subject films from a central database (video-on-demand), do teleshopping, use educational programs or take video courses and test the most recent video games.

It is not only the Stuttgart government that has multimedia fever. "Every land politicians will be involved up front in

such pilot projects," observes Jean-Claude Bisenius, managing director of the consulting company *bisenius teleconsult* from Neulingen. Test runs for interactive TV (ITV) will also take place in Berlin and Hamburg, as well as in Nuremberg, Leipzig, Munich and in the Cologne/Bonn region.

What at first glance looks like an atmosphere of departure is in fact often blind activity. The projects are not coordinated with one other, the consumers are not asked for their preferences, the technologies are largely unknown. Even at Deutsche Telekom AG those in charge regard the variety of projects only with mixed feelings: "As network operators we are being reminded of our duty by every father of the people—and that costs a lot of money," complains a high-ranking telecommunications manager.

"The projects are primarily technological enterprises," consultant Bisenius also says in criticism. For Telekom it is principally a matter of whether fiberoptic cable must be laid in the subscriber households or whether the good old telephone network is sufficient as transportation path for the flows of multimedia information. For the suppliers of the required database computers and the associated software it is important to test the storage and—above all—the rapid distribution of this gigantic volume of data. End equipment manufacturers are primarily interested in the functioning of the set top boxes, with which the stream of digital multimedia data is decoded so that it appears on the television screen.

The service suppliers—publishing companies, arrangers of television programs, commercial firms or auto conglomerates—in most cases tap into the era of interactive media consumption without much preparation. As late as a few months before the scheduled start, it still largely remains to be seen with which media and information offers those who participate in the ITV tests will be blessed.

"For many, the vertical takeoff into the multimedia era will probably be more like blind flight," mocks someone who knows the supplier market. That is fatal. After all, the user couldn't care less about the technology. The services offered decide the consumers' acceptance. The problem is: The viewer—regardless of the actual objective of the supplier's desire—has largely disappeared from the suppliers' field of vision in the hustle over the furious technological progress and the prognosticated megamarkets. Says Bisenius: "The viewer will be degraded into a guinea pig."

Here a more specific glance at the public's interests could not hurt. For Carl Lehmann, director of the international consulting company BIS Strategic Decisions, what is important is not offering the full range of services in multimedia pilot projects. "What is crucial is to bring services with interactivity, even if limited at first, to the cable networks. The viewers must initially be guided 'very slowly' toward interactivity. Also, various tests prove that commercial services by no means rank first in consumer wishes."

The U.S. adviser stresses that television is regarded by the vast majority of viewers as a medium for passive entertainment: "Even U.S. consumers, who in comparison are surely more crazy about television, do not regard the TV set as an interactive tool." The head of RTL-Deutschland,

Helmut Thoma, has held this opinion for a long time: To the viewer, "remote operation and the on-off button are still enough in matters of interactivity." Raymund Werle of the Max Planck Institute for Social Research in Cologne puts his finger on the mood of the multimedia scene: "The fact that certain markets for interactive television services might possibly not even exist has been completely ignored."

In fact, a closer look at the ITV market potential as seen today has a sobering effect. In a study on the economic opportunities of digital television Klaus Schrape, media expert at the Swiss Prognos AG in Basel, arrives at the result that in the year 2000 there will be DM3.8 billion available for new TV offerings. Says Schrape: "Applied to the 3 to 4 million households which will then have digital reception possibilities, DM90 would be spent each month for digital programs." A tidy little sum, at first glance. But the ITV income is balanced by enormous investments in the required infrastructure and equipment development, for example.

Furthermore, among scientists and media entrepreneurs there is largely agreement on the prediction that even in the medium term only about one-third of all television viewers can be gotten interested in interactive media offers. Company consultant Bisenius says: "Two-thirds of the recipients will remain completely passive about media consumption."

Sooner or later, the elation in the media and telecommunications industry is likely to give way to a more realistic evaluation. "The whole thing will develop out of its niche," believes Jean-Claude Bisenius. He follows the extravagant announcements by the political prominent with conflicting emotions. They cause the public's expectations to rise too high. "Then, when they get disappointed in the pilot projects because of a lack of results," Bisenius fears, "interactive television will be born with a severely damaged image."

Expert on Opportunities, Risks

95WS0245C Duesseldorf WIRTSCHAFTSWOCHE
in German 23 Feb 95 p 126

[Interview with Franz Joseph Radermacher, a scientist from Ulm, by Burkhard Boendel: "Dramatic Change"]

[FBIS Translated Text]

[Boendel] Professor Radermacher, will the information superhighway change our life?

[Radermacher] Yes, quite dramatically. The opportunities of the global information exchange are increasing considerably and with them the intensity, quality and variety of communications processes of all kinds. All social systems, whether the economy, politics, legal system or family, will be affected by it. The information superhighway will become the global nervous system of humanity.

[Boendel] Where are the opportunities and where are the risks?

[Radermacher] In the future work, leisure time and family will be easier to combine with one another. If the information superhighway is correctly arranged, the opportunities

for political cooperation by persons and groups will increase. The waste of material and energy can be considerably reduced with sensible application by means of the availability and better utilization of information. At the same time the worldwide division of labor can be further improved and the solution potential be used everywhere in the world. In this environment one already speaks of virtual markets and companies that will form to be active in them. Seen from a national economic aspect, there are powerful new markets opening up here in which we can participate. This reaches all the way to globally marketed education products.

[Boendel] So nothing but a beautiful, ideal, new world? Are there no risks?

[Radermacher] Slow down. On the one hand, more data about the details are being produced and processed with which at least potentially dangers can be held in check through controls and manipulation; here it is important to take precautions. On the other hand, we must find ways to channel and structure the expected vast amount of information correctly, so that too much information does not end up in confusion or randomness.

[Boendel] And if you evaluate the economic side?

[Radermacher] Then you must bear in mind that scientists, technicians or administrative experts from countries with considerably lower wage costs per data superhighway are offering their services, so that value-creating potentials could possibly shift. Here we get an entirely new competition—above all in the field of education and consulting.

[Boendel] Is Germany prepared for this change?

[Radermacher] Technically seen, yes. We already have an outstanding and internationally noted infrastructure today. The question is only whether we will recognize and grasp the opportunities in time. On the one hand the social groups, which have many advantages as a result of today's information asymmetries, must give up privileges. On the other hand, more innovative enterprises must be created to make and market the products for the information superhighway.

[Boendel] Where is the problem?

[Radermacher] With our supercautious, risk-averse and bureaucratic mentality and our poor framework conditions for starting companies, we have considerable shortcomings in this respect. At the moment it looks as if the predominant number of these products will come from the United States. Here changes must quickly take place, if we are to remain competitive and want to open up this promising market at least in part for ourselves.

German Telekom Stresses Multimedia Pilot Projects, Research

95WS0216A Duesseldorf *HANDELSBLATT* in German
16 Feb 95 p 22

[Article by "wt": "German Telekom Intensifies Research for Multimedia Market"; "Pilot Project for Interactive Video Services Started in Berlin"]

[FBIS Translated Text] German Telekom wants to get involved in the multimedia market in a big way. Hopes rest primarily with business customers. Telecommunications companies are gearing their networks up for the new applications.

Berlin, Tuesday, 14 March 95. By the year 2000, German Telekom AG of Bonn wants to get roughly 16 billion German marks [DM] from the group's approximately DM80 billion in business from new services. A not insubstantial part of the new business will go to the multimedia sector, Hagen Hultzsich, director of Technik Dienste, said in Berlin at Telekom's press conference.

The state[run] telephone company is trying for a 20-percent share of the multimedia mass communications market, which he estimates will be around DM4.1 billion in Germany by the turn of the century. Hultzsich includes in this market segment various forms of interactive television such as "pay-per-channel," "pay-per-movie" and "television-by-request." He attaches increasing importance to the use of PC's in the home. It is expected that by the year 2000 every other European household will have at its disposal a multimedia-capable PC (the share today is 8 percent).

A considerably larger market volume is expected for individual multimedia communication, which is heavily used by business customers. Telekom's executive board foresees the growth in Germany to be from around DM440 million last year to about DM13 billion by the turn of the millennium. Telekom is trying for a 30-percent market share (DM3.8 billion). The European market could grow during this period from DM1.8 billion to DM58 billion.

In preparation for this business, the group is investing approximately DM25 million annually in multimedia pilot projects. This promotes the development of new applications and their own services in the multimedia area, Hultzsich said. In all, Telekom spent just about DM300 million in 1994 on research. By the year 2000 that amount should climb to DM400 million. He estimated the entire research and development budget for 1994 at around DM1 billion. By the end of the century these expenditures should reach DM1.68 billion.

Gerd Tenzer, chairman of Technik Netze, emphasized that Telekom has developed in an "evolutionary" manner the information highways necessary for multimedia systems. Thus, the Euro-ISDN was started at the beginning of 1994 together with 25 network providers in Europe: it is based on the well-known ISDN, which stands for Integrated Services Digital Network. In Germany, only Euro-ISDN connections were set up.

In order to offer more comprehensive services, Telekom, together with network providers from 14 countries, is testing ATM technology. This is the transmission basis for the so-called broad-band ISDN, which allows for the transmission of static and moving images of even higher quality. The commercial test operation between Berlin, Hamburg and Cologne is to start at the CeBIT [trade show]. In addition, still this year [Telekom] together with its strategic partner France Telecom of Paris is going to offer commercial broad-band ISDN services between Paris, Lyon, Stuttgart, Karlsruhe, Heidelberg and Ulm.

Hultzsch opened in Berlin the first of five pilot projects planned in Germany for testing interactive video services. About 50 participants are involved in the project which was set up by Alcatel SEL AG of Stuttgart. The "call-up videos," "pay-per-movie," "home shopping," "information services," and "on-screen learning" services are accessible to everyone in the German Radio Broadcasting Museum, in KaDeWe and in the Post Office Museum on the Urania. The chairman announced that Telekom will endow a professorship in Intelligent Networks and Management of Distributed Systems at the Technical University in Berlin.

German Telekom Offers Information Highway, Video Services

95WS0225C Munich *COMPUTERWOCHE* in German
24 Feb 95 p 6

[Article by "pg": "Telekom Spruces up Its Image With Information Highway and Video Pilot Projects"]

[FBIS Translated Text] Berlin—Berlin is blossoming into the German capital of the telecommunications business as well. The metropolis and Telekom, respectively, are now making headlines with two projects simultaneously: On the one hand by taking into service the information highway between Berlin and Brandenburg, on the other hand with the starting shot for the "interactive video services" pilot project.

Telegenically, with the obligatory pressing of the button, Eberhard Diepgen initiated the data superhighway between the capital and Brandenburg. By so doing Berlin continues the old traditions, according to Diepgen. By using the first telephone in Germany in 1877, as well as by having 400,000 connections in the local network as early as 1930, the city has always been at the forefront of technical progress.

Although the data highway taken into operation is still small, the project has considerable prestige value: Nationally, because the carrier intends to create perfect telecommunications logistics in that location since the government agencies will move from Bonn to Berlin. Internationally, because in information highway matters Telekom is showing the flag across the border.

With a swipe at the discussion in the United States and Japan, Gerd Tenzer, responsible for network technology on Telekom's board of directors, therefore said: "While in other places there is still discussion about opportunities and risks, innovations and investments, we in Berlin have already begun to build the information superhighway." Tenzer explained in this context that in the formerly divided city 62,000 kilometers of optical fiber represent the nerve paths of the network, which is to be completely digitized in two years.

Seven Billion for Berlin's Telecommunications Infrastructure

According to Tenzer, Telekom has already sunk seven billion German marks [DM] into Berlin's telecommunications infrastructure over the past five years, and another 8 billion are to follow. A part of it go to the optical fiber

network, over which the synchronous and digital transmission technology SDH [Synchronous Digital Hierarchy] will be operated. Based on this is then the ATM [Asynchronous Transfer Mode] process, with which customers will be offered transmission services in time segments as well as graduated bit rates to 155 Mbit/s. Telekom board member Horst Gellert, who until the end of March 1995 is still in charge of business customers, announced cheaper ATM charges effective immediately for this purpose.

In the initial expansion stage the network is available to users in the center of Berlin as well as in the entire Potsdam area. Telekom is trying to achieve comprehensive coverage of the Berlin and Brandenburg region by the end of 1995. With its network, installed by the ECI, PKI and Siemens companies, Telekom aims primarily at large customers. In this context Tenzer expressed the hope that the land, municipalities and enterprises would now develop the necessary multimedia applications for this telecommunications infrastructure.

The pilot project Interactive Video Services is not aimed at large customers but at the private user. According to Hagen Hultzsch, head of the Telekom division for Technology Service, the field trial is the first of six projects which will be initiated in 1995 and 1996 by the network operator. As test cities Hultzsch mentioned Hamburg, the Cologne/Bonn metropolitan region, Stuttgart, Nuremberg, Leipzig and perhaps Munich as well.

The project in Berlin is initially limited to 50 participants. As explained by Johann Stekle, head of the business division BK Networks and Services at Telekom, it, just as the other trials, is intended to provide information about various technologies, network design and the acceptance of the services offered. Stekle did not want to provide any details about the cost of the Berlin experiment.

New EC Conditions on France Telecom, German Telekom Merger

95WS0246A Paris *LE MONDE* in French 1 Mar 95 p 19

[Article: "Brussels Frustrates Proposed Alliance Between France Telecom and German Telekom"; first paragraph is *LE MONDE* introduction]

[FBIS Translated Text] Accused of having a dominant position, the two companies will have to modify their accord. At a time when the envisaged partnership between the two European companies and America's Sprint looks like it might be approved by authorities in Washington, the European Commission is going to force France Telecom and German Telekom back to the drawing board. Karel Van Miert, European commissioner for competition, has already entered into talks with a view to arriving at an arrangement with the two telecommunications operators.

Brussels—The proposed partnership between France Telecom and German Telekom is incompatible with Treaty of Rome provisions (articles 85 and 86) governing competition, because it would end up strengthening the dominant position the two groups already enjoy on the market. Major modifications will be required to get the green light from Brussels. This, in essence, was what Karel

Van Miert, European commissioner for competition, told French Industry Minister Jose Rossi, German Economic Affairs Minister Gunter Rexrodt, and Wolfgang Boetsch, German minister for posts and telecommunications, in talks Sunday 26 February on the margins of the G7 conference.

In principle, nothing is quite official yet: the Brussels staff report is not finished, but the tone is unambiguous, and negotiations have already started in an effort to reach a compromise. Marcel Roulet, head of France Telecom, and his German counterpart will meet in Brussels on 1 March with Mr. Van Miert.

The European participants in the proposed transatlantic alliance are even now cooperating, under the aegis of Atlas, their joint subsidiary, in areas already open to competition, especially data transmission. Atlas was the subject of a Commission notification issued 16 December. The proposed American connection—the European firms' acquisition of an interest in Sprint, one of the three long-distance transatlantic operators (its competitors are AT&T and MCI)—has not yet been the subject of a detailed notification.

The American project has not yet been approved by authorities in Washington. But the approval process seemed off to a good start after Vice President Al Gore at the G7 conference proposed to allow more foreign investment in American telecommunications enterprises. Especially since the U.S. administration—particularly its antitrust bureaucracy—appears to be increasingly worried about the powerful resurgence of AT&T in the United States. This group, under the leadership of Robert Allen, has recaptured significant market shares from MCI and Sprint in the last few months. In that context, the administration would not want to cripple Sprint unduly by torpedoing its European alliance. France Telecom and DBT [German Telekom] saw a real opportunity opening up in the United States. And it was just at that point, ironically, that complications surfaced in Brussels!

Imagination

On 22 February, the Commission formally requested information from the French and German groups. The groups have until 6 March to respond, and Brussels will then have 2 more months in which to decide whether or not to veto the proposed alliance. In accordance with procedures prescribed under the treaty, the Commission has invited interested third parties to comment. And numerous comments have been submitted, it was learned, including a formal complaint filed by BT (the former British Telecom).

In their preliminary analysis, Mr. Van Miert's staff opine that the alliance between the French and German giants would be a step backward for competition. Now it is up to them, as officials in Brussels explained, "to show some imagination" in coming up with ways to make their plan more acceptable.

Several possibilities were floated—only in a preliminary way so far, of course—in Sunday's talks between the commissioner and the ministers. Brussels might show itself more accommodating if France and Germany were to

move more quickly, i.e., without waiting for the 1 January 1998 deadline, to effect the liberalization of their "alternative" telecommunications infrastructures (cable networks and most of all private railroad and power companies).

Another formula that apparently was also mentioned: The status of Atlas might be revised in such a way that the joint subsidiary could market data services throughout the European market without necessarily transiting France Telecom or German Telekom. Mr. Van Miert reportedly is favorably disposed to entertaining such suggestions, though he believes additional steps would be required.

Activities of German Telekom

Datex-J Service Expanded

95WS0261A Munich *COMPUTERWOCHE* in German
3 Mar 95 p 33

[Article: "Telekom Further Perks Up Datex-J Service with Internet Gateway"; Subheadline: "Multimedia Features Using Graphic User Interface"]

[FBIS Translated Text] Berlin—Telekom AG [Incorporated] is staking everything on developing the latest success of the Datex-J service. With the graphic user interface [GUI] "Kernel Software for Intelligent Terminals [KIT]" plus online access to Internet offerings, the carrier hopes to further perk up its value-added service and to be able to market them to personal computer [PC] users as gateways to the world of multimedia. Telekom itself also intends in the future to emerge as a supplier of Datex-J and Internet contents.

Shortly before the final moment Telekom's long-standing problem child appears to have made the leap to the safety of the shoreline. In 1996, as stipulated by Telekom's board, the service finally had to go into the black if it were not to be halted. Presently all indications are that the team from Bonn might actually be able to realize this goal. Eric Danke, manager of the specialized area of value-added text, data and images services, told *COMPUTERWOCHE*: "In 1995 we will continue to experience slight losses, but in 1996, we will realize break-even."

Btx pioneer Danke's prophecy might be correct. In 1994 the number of Datex-J subscribers grew by 43 percent to 700,000 users. Meanwhile, the Telekom service is already reporting nearly 730,000 users—trending steadily upwards. Therefore, in the past two years, since the renaming of Btx as Datex-J, more connections have been added than in the previous eight years of Btx's existence as a public service.

A few more statistics; according to Telekom more than 13 million dial-ups a month are being made with an average session lasting 15 minutes. Hence, the useful duration of each call is declining. Datex-J czar Danke attributes this development to the increasing number of private users. At present, 60 percent of the carrier's online service is used by private users and 40 percent of it is commercial. The latest boom has introduced another modification in demand behavior. Not too long ago, profession use was still uppermost.

In the view of Telekom board member Horst Gellert, the PC stands out as being accountable for Datex-J's booming growth. According to the manager, increasing processor power and memory capacity, the spread of CD-ROM [compact disk-read only memory] drives plus computer multimedia capability are generating the explosive demand on Datex-J. Currently about 85 percent of the subscribers are so-called PC users—according to Gellert, users in the truest sense of the terms since they “perform the responsibilities of daily life via the medium of Datex-J.”

In this connection the managing director mentioned home banking, home shopping, telesoftware, access to air and rail timetables plus public discussion forums. Meanwhile, according to official Telekom data, domestically more than a million money-order accounts are conducted via Datex-J and more than 500 million marks [DM] are turned over in mail order business from online orders.

To be able to serve private and professional user customers in an updated manner, strategists from Bonn are currently planning, under the rubric “Telekom Online,” for a multimedia face-lifting of their info-service. At Telekom's international press roundtable in Berlin, Gellert announced: “This year we will ensure Datex-J's conversion into a multimedia service meeting all current standards.” One aim of the carrier is to combine the service's online activity and the intelligence and memory capability of the terminal in Telekom Online. For this purpose the company has developed with industry a GUI called KIT that is being submitted for international standardization, according to Gellert.

With Telekom, since early 1995, offering, over and above the existing dictionaries, a new navigation system leading customers via rubrics in a targeted fashion to what is available, KIT now is supposed to afford even greater user friendliness with the windows-oriented interfaces. The GUI encompasses the full scope of PC resources. With it no longer are complete pages transmitted as hitherto, but instead, only individual objects including text, graphics, video and audio data. According to Telekom, even brief video sequences are possible. The objects are stored in the PC so that when a text document is reinvoked the data no longer have to be carried over the system. Instead, the computer: the already existing data and loads them directly from the hard disk. The result is reduced processing times and communication costs. KIT is being demonstrated in a beta version at CeBIT '95 and as early as the summer it is supposed to be made available as a decoder to all Datex-J customers. Telekom will furnish suppliers tools for editing in order to be able to produce KIT applications. According to Datex-J specialist Danke, KIT will start out running under Windows and is to be followed later by GUIs for Apple Macintosh, Operating System [OS]/2 X-Window as well as OSF [Open Software Foundation]/Motif.

Telekom is planning another goody for Datex-J subscribers with an Internet gateway. By means of it Btx users should be able to access online what is available on the Internet. After the Hannover fair, the carrier will launch a pilot project that is supposed to turn into regular operation before the end of 1995.

With this offering, Gellert hopes to be able to develop “Datex-J into an information highway for everyone.”

One component of the Internet portfolio associated with Telekom Online will be an e-mail function. Every Datex-J subscriber in the future will be given an Internet mail address whereby he can be reached from around the world. According to Telekom it will also be possible to send data files directly from a PC application on the basis of widespread mail clients as well as the exchange of news via the Internet or the worldwide X.400 association. Besides e-mail links, Datex-J officials are also striving for access to the Internet World Wide Web, Telnet, FTP [File Transfer Protocol] and Usenet services.

Datex-J manager Danke admitted to COMPUTER-WOCHE that Telekom also intends to be present on the Internet as a service provider. Integration of Internet on Datex-J will be provided at no increase in the price of the DM8 monthly fee. On the other hand, it remains unclear what tariffs the system operator will charge for services on the Internet. According to Danke, the strategists are mulling over clocking entailing a tariff of between 10-15 pfennigs per minute. Danke did not preclude staggered prices with lower fees for large volumes.

The decoder will convert the session between Datex-J and Internet into TCP/IP [Transmission Control Protocol/Internet Protocol], as Danke explained the required process. No decision has been made yet, however, regarding a browser. The manager of the specialty sector explained that getting a license for Mosaic would be quite costly for Telekom as a service provider. Telekom therefore is considering developing a proprietary navigation tool.

By the autumn of 1995, under Telekom Online the system operator will also equip all 30,000 network accesses to Datex-J with at least 14,400 baud and in heavily populated centers install even special accesses having 28,800 baud. Last but not least, the team from Bonn also wishes in the future to attend to greater quality on Datex-J. If Gellert has his way, the entire offering in the future will no longer be a conglomeration of random isolated offerings. The gentleman from Telekom's board summarized the new direction of thrust: “Through privatization we have the alternative now of offering contents on our own and closing the gaps in available offerings.”

14 ATM Nodes on Superhighway

95WS0261B Munich *COMPUTERWOCHE* in German
3 Mar 95 p 36

[Article: “Telekom Lays Foundation for Information Highway with 14 ATM Nodes”; Subheadline: “Video-Demand Projects to Probe Private Interest”]

[FBIS Translated Text] Berlin—Telekom wants to slice itself a thick chunk of multimedia cake. By the year 2000, 16 billion marks [DM] in turnover will allegedly be gained through TK [transmissions and telecommunications] services. This means that traffic via professional and private multimedia applications will therefore generate the carrier's primary foreign currency. Telekom really wants to declassify itself as the middleman for commercial sector applications in telecommerce, telemedicine, telebanking, telelearning, etc. Strategists project that the carrier domains of transmission and services will account for nearly 35 percent of the market volume forecast for the

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turn of the century. Telekom intends to guarantee itself the lion's share of this core business in the competition with other suppliers.

According to market research estimates, in the year 2000, DM58 billion will be invested in Europe for multimedia with all the accoutrements. DM13 billion of that is supposed to be turned over just in Germany where, at present, it is only DM440 million. In order to grab for itself as much as possible of the projected third of the total volume for system services and transmission, the Bonn company plans further development of the system plus more attractive tariffs.

For broadband applications the investment in glass fiber links is to be increased. According to Gerd Tenzer, managing director of systems engineering, between 1995-1997, the carrier will plow nearly DM500 million into the "Fiber in the Loop" project. Besides high bit rate links in the telesector, the aim is also to create a backbone for volume intensive multimedia applications all the way to the customer. What is more, Telekom's entire network is supposed to be digitized by the end of 1997.

In the telesector the German systems operator has announced a further development of the ATM [Asynchronous Transfer Mode] infrastructure. Currently, at the CeBIT '95, it is launching a commercial ATM test operation between Berlin, Hamburg, Cologne and Bonn, for which new, use-focused ATM rates are in effect. By April of this year Telekom wants to install a total of 14 ATM network nodes in Germany's high-population centers and thereby take a giant step towards the Information Highway.

While a system monopolist with ATM appeals to business customers, it will skim the cream in the private sector too for multimedia. In the year 2000 the company will turn over almost DM1 billion with multimedia mass communications. Altogether, by the indicated time period, the volume in this sector is projected at DM4.1 billion.

For this purpose Telekom in Berlin has currently activated the "Interactive Video Services" pilot project. According to Hagen Hultsch, managing director of the Telekom engineering service sector, the field trial is the first of six projects being conducted in 1995 and 1996 (consult table). In the trials, different system alternatives are to be tested for the return channel—from ADSL [Asymmetric Bit Rate Digital Subscriber Line] wiring via coax to glass fiber.

For the time being the project in Berlin is limited to 50 subscribers and Telekom has not provided any data regarding the costs of it. In the federal capital the offering includes video on demand, pay radio, home shopping, telelearning, city information, a health channel plus digital television. The set-top box needed for interactive communication was supplied free of charge to all participants. Retrieval of data and offers is free of fees for the time being except for the Otto direct mail home shopping.

Besides Telekom in Berlin, Alcatel/SEL is technologically responsible for the project. The telecommunications firm provides both the set-top boxes and the central video server. In the server, analog films received via satellite are digitized in real time, compressed and stored as program content. The offerings are fed through the cable network's coaxial cable with Telekom in Berlin using a process that does not block the subscriber's telephone connection during an interactive retrieval.

Interaktive Video-Services Übersicht über die Pilotprojekte

Ort ①	Berlin	Hamburg	Köln/Bonn ²	Stuttgart	München ³	Nürnberg ⁴	Leipzig
5 Demo-Projekt					6 Datenautobahn/ATM		
Teilnehmer/ Verteildienste	50	1000	100	max. 4000	1000*	1000	100
Teilnehmer interaktive Dienste 8	50	100	100	max. 4000	100*	100	100
Gebiet 9	Innenstadt ¹⁶	Innenstadt ¹⁶	noch offen ¹⁷	Großraum ¹⁸	noch offen ¹⁷	Großraum ¹⁸	noch offen ¹⁷
Beginn 10	Februar 95 ¹⁹	II/95	II/95	II/95	noch offen ¹⁷	II/95	IV/95
Dauer 11	1 Jahr ²⁰	1,5 Jahre (in Einzelfällen bis 2 Jahre) 21					
Dienste 12	PPC, PPV, Pay-Radio, near Video on demand, Service on demand (Homeshopping, ...)						
Besonder- heiten 13					ATM-Switch	Multimedia-24 Anwendungen	
Verteil- technik 14	BK- ²² Koaxialnetz + Glasfaser	BK- ²³ Koaxialnetz	BK- ²² Koaxialnetz + Glasfaser	BK- ²² Koaxialnetz + Glasfaser	BK- ²² Koaxialnetz + Glasfaser	BK-Koaxialnetz + Telefonnetz (ADSL) 29	Glasfasernetz OPAL ²⁵
Rückkanal- Technik 15	Telefonnetz ²⁶	Telefonnetz ²⁶	BK- ²² Koaxialnetz + Glasfaser	BK- ²² Koaxialnetz + Glasfaser	BK- ²² Koaxialnetz + Glasfaser	Telefonnetz + ADSL ³⁰	Glasfasernetz OPAL ²⁵

*derzeitiger Diskussionsstand 27

28 Quelle: Deutsche Telekom

Interactive Video Services/Survey of Pilot Projects

Key: 1. Location; 2. Cologne/Bonn; 3. Munich; 4. Nuremberg; 5. Demonstration project; 6. Information Highway/ATM; 7. Subscriber distribution service; 8. Subscriber interactive service; 9. Region; 10. Start; 11. Duration; 12. Service; 13. Peculiarities; 14. Distribution technology; 15. Return channel technology; 16. Inner city; 17. Still undecided; 18. Metropolitan area; 19. February 1995; 20. 1 Year; 21. 1.5 years (in some cases up to two years); 22. BK coaxial network + glass fiber; 23. BK coaxial network; 24. Multimedia applications; 25. Glass fiber network OPAL [optical exchange line]; 26. Telephone system; 27. Current status of discussion; 28. Source: German Telekom; 29. BK coaxial network + telephone system (ADSL); 30. Telephone system + ADSL

1994 Sales Increase 8 Percent

95WS0261C Munich COMPUTERWOCHE in German
10 Mar 95 p 5

[Article: "Telekom: Successful Final Year Under Government Control"; Subheadline: "60,000 Employees to Go by Year 2000"]

[FBIS Translated Text] Hannover—In fiscal year 1994, German Telekom AG increased its turnover by nearly 8 percent to almost DM64 billion, based on preliminary figures. However, the operative result of nearly DM5 billion still has to be paid in full to the federal government so that the carrier in Bonn is likely to conclude its final year as a government enterprise with "plus-minus zero," in the words of Wilhelm Paellmann, its interim chairman of the board.

As Paellmann emphasized to the press in Hannover: "all corporate sectors participated" in the former postal enterprise's heartening increase in business volume. Telephone service that added nearly 8.5 percent to almost DM46 billion, however, remained the Bonn telecommunications outfit's most important turnover platform. In the same period the number of telephone connections increased from 37 to

39.2 million (the number of cable connections, from 13.5 to almost 15 million). In 1994, according to Paellmann, more than 1.4 million new connections were made just in the new laender and East Berlin.

In the current fiscal year Telekom's management expects the favorable turnover trend to continue. Statistically expressed, this means a projected increase in turnover of nearly DM5 billion to nearly DM69 billion. Simultaneously, the firm now wants gradually to reduce its labor force by nearly 60,000 employees to a total of 170,000 employees by the year 2000 which, as early as 1995, would signify a per capita increase in turnover from DM278,000 to DM307,000. Among other things, Paellmann used the European Union [EU] Commission's decision to now eliminate the network monopoly as early as 1998 instead of in the year 2000, to justify, when compared with earlier planning, the definitely increased cutback in positions that was to be realized through normal attrition and early retirement and compensation regulations that had already been adopted.

Also critical for future business success will be Telekom AG's rapid international orientation that is as comprehensive as possible. According to Paellmann addressing the

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company's future strategy, this is all the more the case since "we want to sell products and services not only to customers operating globally but we also have to rally against our domestic and worldwide competitors who are allowed and eager to generate business on our home market." The cornerstone of the respective efforts in this context continues to be planned cooperations with France Telecom and Sprint. The current head of Telekom, however, refused to make any comments on speculations regarding an inclination by anti-monopoly authorities in Brussels and Washington to reject this.

Germany: GMD's Asynchronous Transfer Mode Pilot Network Described

M11403080095 Sankt Augustin GMD-SPIEGEL
in German No 4, Dec 94 pp 57-58

[Report by Peter Wunderling, project leader at the GMD's Network Center Research Department: "The GMD's ATM Pilot Network in Sankt Augustin"; first paragraph is GMD-SPIEGEL introductory abstract]

[FBIS Translated Text] *The Network Center Research Department at the GMD [Society for Mathematics and Data Processing] Institute of Application-Oriented Software and Systems Engineering is working on potential uses for the GMD's ATM (asynchronous transfer mode) pilot network, which supports transmission rates up to 155 megabits per second [Mbit/s], under the heading of "GMD Data Highways. Linked by the DBP [Deutsche Bundespost] Telekom B-ISDN [broadband integrated services digital network] Pilot Network." On the GMD's 1994 open day [at Birlinghoven Castle], the network was used as, among other things, a multimedia conference system platform. It was linked up with the GMD Institute of Open Communications Systems' local ATM network in Berlin via the DBP Telekom B-ISDN pilot network.*

The year 1994 began with the setting up of the ATM pilot network in the GMD's Birlinghoven/Sankt Augustin area. In its role as a transmission mode in the B-ISDN, asynchronous transfer mode can be used as a transmission protocol both in local area networks (LAN's) and in wide area networks (WAN's), at transmission speeds ranging from 2 Mbit/s to the current 155 Mbit/s. ATM's special feature is that it is able to guarantee what is known as "quality of services" for applications, for example, particular transmission speeds, for the duration of transmission, a function not provided by conventional transmission protocols. These latter protocols, such as Ethernet, FDDI [Fiber Distributed Data Interface], and X.25, thus have only a limited capacity for meeting the demands made by asynchronous applications—high bandwidth, guaranteed bandwidth—when, for example, image, video, and speech transmission is required.

As the GMD's institutes and projects in its main research fields increasingly require broadband networks, it was decided to set up a high-capacity communications infrastructure based on ATM technology at the GMD's premises in Birlinghoven/Sankt Augustin, Berlin, and

Darmstadt. This technology will be installed in such a way that it can be used both as a test environment for innovative applications with high broadband requirements and as the backbone for the existing communications infrastructure (Ethernet, FDDI, etc.).

The pilot network at Birlinghoven/Sankt Augustin currently uses Fore Systems (ASX-100) and Siemens (Hicom ATM-P) ATM systems. Optical fiber cables that can run at 100, 140, or 155 Mbit/s regardless of the interfaces involved are used to link the ATM systems together and to network the workstations. An optical fiber cable rented from Telekom also links the ATM systems at Sankt Augustin and Birlinghoven Castle.

Several Sun workstations are currently linked up to the pilot network for various applications involved in GMD projects. An application for video-on-demand via the ATM network was successfully demonstrated at the event on "European Application Prospects for Telecooperation" organized by the GMD's Multimedia Applications For Telecooperation project and held in the castle in June 1994. There are plans to link a specially equipped ATM system to the satellite link used in the project, thus making it possible to convey ATM data streams transparently over satellite links at speeds of 2 to 8 Mbit/s and, for example, to link local ATM networks together.

Further plans envisage internetworking the GMD's ATM networks in Birlinghoven/Sankt Augustin, Darmstadt, and Berlin. The DBP Telekom B-ISDN pilot network and the RTB's (regional testbeds) planned for 1995 and/or the German Research Network Promotion Association's HS-WiN (High-Speed Science Network) are the obvious choices in this respect.

The DBP Telekom B-ISDN pilot project is a high-speed network linking Berlin, Hamburg, and Cologne/Bonn. It uses ATM technology and supports speeds of 2, 34.5, and 155 Mbit/s. The European telecom corporations' Euro-ATM pilot network is accessed via Cologne. Telekom also plans to bring Stuttgart and Munich into the pilot experiment.

DBP Telekom provided a test line to set up the link to the B-ISDN pilot network, which was successfully demonstrated on the GMD's open day at the castle. The GMD's ATM networks in Berlin and Birlinghoven were linked together via the Siemens Hicom ATM-P system. In view of the fact that the B-ISDN pilot network project is restricted to Cologne/Bonn, Berlin, and Hamburg, it can be used to network only the GMD centers in Birlinghoven/Sankt Augustin and Berlin.

The German Research Network's HS-WiN is the obvious choice to link up the GMD's ATM network in Darmstadt. The German Research Network is promoting the creation of regional testbeds with transmission speeds up to 34.5 Mbit/s that intend to use ATM as their basic technology. These regional testbeds are scheduled to enter service early in 1995 and to be converted into an extensive HS-WiN, probably at the end of 1995. The local ATM networks at all GMD locations could then be linked together via this HS-WiN.

Germany: Alcatel SEL AG Trims Workforce, Installs Digital Switching Systems

95WS0222A Munich *COMPUTERWOCHE* in German
17 Feb 95 p 25

[Article by "CW": "Alcatel SEL: A Lot of Patience in Getting Through Tough Times"; "16,000 Positions Eliminated as Announced"]

[FBIS Translated Text] Stuttgart—The recovery measures announced last November for Alcatel SEL AG are also being continued under the new board of directors which has been in office since the beginning of January. At the same time, the company wants to "approach" the break-even point and return to profitability in 1996.

Consolidation has apparently been the name of the strategy at the embattled Stuttgart electronics group since January of this year when the group's French parent company pressured Gerhard Zeidler, who had held the office of CEO until then, to give up his post: this marked the high point in a long, drawn-out crisis. In any case, the people in Stuttgart have everything under control again—including, allegedly, the scheduled losses.

So, according to reports from the economic information service "vwd," the new five-member Alcatel board of directors said that 1994 business was, as planned for, down 4 percent to 5.4 (5.6) billion marks [DM]. Losses in 1994 reached—as predicted—a level of DM500 million. Of this, around DM300 million are operative losses; the remainder is apportioned to provisions made for cutbacks in personnel.

According to statements from Alcatel management, this will only go as far as the announced personnel reduction to around 16,000 employees by the end of 1995. That is roughly 5,300 fewer jobs than at the end of 1993. Nuremberg, Stuttgart and Rochlitz are the locations primarily hit by the massive cutbacks in personnel. At the same time, according to Peter Landsberg, the new spokesperson for the board of directors, the plans are to flatten the hierarchy within the company. Thus, under him there will only be three instead of the previous five administrative levels; the company divisions for switching systems and transmission systems are to be merged into one unit.

It is specifically in these two areas of business (due to public contracts, long the sales and profit backbone) that there were drastic losses to contend with, especially in the German market, because of increasing competition in the Telecom sector. In spite of this, the Alcatel group still managed acceptable results here, as shown by recently published figures. For example, by 1994 over 100 million line units of the "Alcatel 1000 S12" and "Alcatel 1000 E10" digital switching systems had been installed worldwide. And as the company further announced, telephone conversations in a total of 112 countries are routed using

Alcatel switching systems. The group's most important market continues to be France with 32 million line units, followed by China with 13 million and Germany with 10 million.

BVB Estimates Seven-Percent Growth in German IT Market in 1995

95WS0220B Munich *COMPUTERWOCHE* in German
17 Feb 95 p 10

[Article by "CW": "BVB Sees a Seven-Percent Growth in German IT Market; Telecommunications to Generate Expansion"]

[FBIS Translated Text] Bad Homburg—The suppliers of information and communications systems active in the German market expect an improvement in their business in 1995. According to an opinion poll, the 230 members of the Federal Association of Office and Information Systems (BVB) are estimating a market growth of seven percent.

According to the BVB, telecommunications services—particularly from the multimedia sector—and networks will be the dominant themes this year. Growth rates of up to 10 percent are to be expected in this market segment due to deregulation and technological innovations. A boom from which hardware and software manufacturers are also profiting, since new applications promote the integration of various segments. Although prices continue to drop in the hardware sector, so that the expected sales growth of around five percent will have to be brought about by bulk business and cost reduction.

The situation is similar for the domestic software market. The Association is in fact estimating an increase in revenue of around seven percent but is of the opinion that software is also increasingly susceptible to price pressures and the trend toward mergers will increase.

"After the recession, which has been overcome, the signs are auspicious for suppliers of information and communications systems," BVB Director Ulrich Schneider summarizes. Although the industry will face important challenges in 1995. Customer orientation and focus on key areas of expertise demand heightened readiness on the part of the suppliers to enter into partnerships and cooperative ventures.

The efforts of the user companies and [government] authorities toward efficient and lean structures may generate important momentum. According to the BVB, these are not possible without investments in information and communications systems. The optimization of the internal and external flow of information becomes a key factor in this regard. The industry has obviously prepared itself for this development. According to the BVB poll, the suppliers see growing sales prospects particularly with regard to [government] agencies, banks and insurance as well as the health care industry.

Germany: Using Datex-J Service as Gateway to Internet

95WS0225A Munich *COMPUTERWOCHE* in German
24 Feb 95 p 1

[Article by "pg": "Telekom: Soon Also Access to Internet Via Datex-J Service"]

[FBIS Translated Text] Berlin—Telekom AG has announced another expansion of the Datex-J data text system. On the occasion of the International Press Colloquium in Berlin, Telekom board member Horst Gellert announced that a gateway to Internet would be created even this year for all Datex-J subscribers.

The carrier intends to present a beta version as early as the CeBIT '95 exposition. Gellert further provided the information that Telekom will act as service provider in Internet. It is not yet clear how much network operators will charge for hooking up through the local network. In addition, Telekom is trying to speed up its service which is regarded as slow. At the end of 1995 transmissions in 14,400 baud, in some places even 28,800 baud, will become reality nationwide at the local rate. Furthermore, it is hoped that a new graphics user surface—called KIT—will give Datex-J more pep.

Hungary: Current State of Satellite Communications Described

95WS0243A Budapest *HETI VILAGGAZDASAG SUPPLEMENT* in Hungarian 16 Feb 95 p 6

[Article by Zsuzsa Regos: "Telecommunications in Artificial Moonlight"—play on words]

[FBIS Translated Text] A few years ago, space telecommunications for businesses existed primarily in the form of plans, and there were hardly any terminals in the country. Previous estimates held that 1,500 terminals could be installed in Hungary without any problem. Based on the current understanding of leading company chief executives, we can say that the previous estimates proved to be quite accurate. On the other hand, no one knows what kinds of demands a hoped-for, actually reviving and flourishing economy could present some day.

SFMT Montana started the year 1994 in new colors and with a new owner, entirely changing the potential of the firm, primarily from a financial standpoint. The firm had 80 terminals prior to 1994. Last year it managed to increase the number of terminals to 400. As a result of this increase, the firm now plays a lead role in the Hungarian market, according to managing executive Istvan Pesti. SFMT Montana has become the sixth largest service provider in Europe, and Europe's largest seller of AT&T Tridom. Sales revenues and the number of employees multiplied as a result of the expansion. Pesti did not provide details in this regard, but revealed that the total assets of the company amounted to approximately 600 million forints. Of this amount, almost 400 million forints materialized in the form of a hub station constructed last year—the largest AT&T hub station in Europe insofar as dimensions and performance are concerned. Regarding this year's plans, Pesti indicated that in his judgment,

having one or two major users as clients does not necessarily provide a large and secure income. Instead, a large and secure income is based on good business strategy. SFMT Montana plans to increase the number of its terminals to between 500 and 600 in 1995, and this will enable the firm to be profitable in the long term.

1994 was a rather important year for HungaroDigiTel, because at mid-year, the firm began operating the satellite central at Lakihegy. As a result of the new hub station, the firm's network became a decisive element of the clearing system that links the various Hungarian banking centers. Notwithstanding this fact, HungaroDigiTel Chairman and President Denes Jobbagy recognized the increased acceptance of satellite telecommunications as the real success story of this year. As a result of the increased acceptance, a truly dynamic development may be expected in this field in 1995. By formulating their computerized systems, banks have prepared themselves to accept the new data transfer technology. Paralleling this development, the firm was able to attract the interest of the populace in certain services. A reliable technology must be developed in order not to disappoint consumers. For this reason the OTP [National Savings Bank] issued a tender invitation for the development of a satellite data transmission technique. HungaroDigiTel won the tender award and the related contract was signed last December. Plans call for the installation of 300 terminals in the first phase, during 1995. A rapid increase in demand suggests that the actual number of new installations will be larger than planned. Jobbagy claims that as a result of this effort his firm has the largest, a definitive share of the market. Jobbagy believes that this year everyone involved in this market will be able to prove the reason for the existence of this technology. In Jobbagy's judgment this is going to be important not only in a general sense, but also because competition is supposedly becoming keener, and it is not certain that every firm presently in the market will remain there in the future.

A firm called BankNet has been developing its system for almost two years. Its 1994 sales volume amounted to 189 million forints, we were told by Gabor David, the firm's director in Hungary. BankNet's dynamic development can be seen from the fact that while the firm had eight network contracts in early 1994, by the end of the year they operated 19 networks. In January 1995 the number of networks increased to 23. Initial success in the Hungarian market prompted the firm's professionals to begin expanding abroad, in addition to strengthening their expansion in the Hungarian market. They developed a distributor network in Western Europe, as well as in Central-East Europe. As a result of expanding outside Hungary, the firm's export revenues increased not only in value, but also in proportions, amounting to 40 percent of all revenues in 1994.

The firm embarked on yet two more significant projects in 1994. They developed a 2 megabit/second large line all the way to England. Thus, all at once, they got inside the world's developed telecommunication centers. The other major step was taken when the firm became the first service point of the self-organizing international network of Internet, enabling the firm to provide the broadest possible data base access in neighboring countries.

Based on existing orders, the firm plans to install 500 terminals this year. (At present there are fewer than 200 terminals. Of these about 150 are located in Hungary.) But additional terminal orders, over and above the 500 orders on hand, will be received, the director believes. In addition to filling these orders, BankNet is planning to introduce new services: Jointly with ORION Atlantic, the firm will develop a so-called transglob network, covering the U.S., Japan, the Far East and India.

Based on all the above, Gabor David believes that BankNet is among the top three, more or less equal professional undertakings in the Hungarian marketplace. Viewed from the standpoint of the number of networks and installations, BankNet has a 35-40-percent market share, and in terms of capacity and total volume of data communications, BankNet's share of the market amounts to 50 percent, as estimated by the head of the firm.

The MATAV [Hungarian Telecommunications Enterprise] SAT-NET Operating Center has so far installed 250 satellite terminals in Hungary, and operates the Hungarian VSAT terminal of a number of international connections, as well as the satellite broadcast station of MTI [Hungarian News Agency] on Naphegy Square. (News transmitted by the data distribution network in the form of pictures and text can be received not only in Hungary but also in neighboring countries on so-called "receive only" VSAT terminals.) The bulk of MATAV terminals, however, establishes duplex data transmission links between the facilities of Hungarian enterprises and financial institutions, through the central (hub) station. MATAV launched its space telecommunication services for businesses in the framework of a leasing structure two years ago, with the central station of ANT Bosch Telecom in Germany. By now, however, the large number of operating terminals ensures the recovery of an investment needed for the establishment of MATAV's own hub station. From among the offers invited, MATAV accepted the offer from the Japanese NEC company. Based on that, Matav plans to operate the hub station in Budapest, next to the Szava Street communication tower. The Customs and Revenue Service will be MATAV's first client to use the satellite data transmission network based on the hub station; MATAV is going to install close to 120 terminals in the upcoming months for the Service.

State of Hungarian Information Technology Viewed
95CH0177A Budapest HETI VILAGGAZDASAG
in Hungarian 25 Feb 95 pp 59, 61

[Unattributed article: "The Basic Technology"—first paragraph is HETI VILAGGAZDASAG introduction]

[FBIS Translated Text] Western authors on the subject describe either with euphoria or skepticism the predicted brave new online world, in which we will not have to leave home to attend to our various affairs. However, the tone of the latest document recommending a national information-technology strategy for Hungary is almost dramatic. Just as 10 to 20 years ago, at the time of the microelectronics program, now too the initiated are frightening us with the prospects of falling behind.

If the Hungarian government continues to delay the elaboration of a comprehensive information-technology program, the country will fall so far behind that it will lose forever its international competitiveness. That dramatic statement was formulated by the representatives of the businesses and organizations that are the principal players in the domestic info-tech industry. It appeared in their study *Nemzeti Informatikai Strategia [National Strategy for Information Technology]*, published late last year. According to the authors, a strategy for information technology, like the basic technology of the entire Hungarian economy and society, must be raised to the level of the national economy.

To judge from the indications, all this appears to remain a pious wish, for the time being. The Hungarian economy's outlays on information technology are far from adequate, reaching only about a third of the desirable level. Information technology's share of the central outlays for research and development is only about 10 percent, as compared with 35 percent on average in the countries of West Europe. The fact that today only a narrow group of info-tech experts possesses the most up-to-date knowledge, and that the introduction of the most advanced applications lags far behind the demand for them—not to mention the gaps in the statutory regulations pertaining to information technology—can be attributed in part, also, to this inadequate funding.

The next century is drawing nigh, and many people believe it will be the age of the information industry. The great invention of the 20th century was the automobile, which has given society unprecedented mobility. But the automobile—in this case as the catalyst of social processes—has reached the limits of its potential. In the last decades of this century, the automobile's role is being taken over increasingly by information technology (which is based organically on electronics, and on computer science and technology), and by telecommunications and consumer electronics. This takeover is producing new, profound changes in the economic and social processes.

All this means that information technology is not some mystical miracle that vanishes into a distant haze. To the contrary, it is rapidly becoming a part of everyday life. With the aid of new communications equipment, people are able to shop from home, consult their doctors, study at home, and telecommute. According to the enthusiastic advocates of a brave new online world, so-called one-stop/nonstop government services will have to develop, where practically everything can be reached over computer networks, at all times.

The technical basis of these hoped-for achievements is primarily the fact that, while the cost of microelectronic devices is declining, their performances are improving. The marriage of telecommunications and information technology is producing computer networks that interlink buildings, cities, countries and continents, and an efficient global multimedia system will evolve. The fusion of computer technology, telecommunications and consumer electronics is opening new prospects. High-speed communication and low-cost storage devices are multiplying the potential of multimedia applications and systems. In other words, such

applications and systems will be able to handle sound, graphics, video, and text in an integrated manner.

On the basis of multimedia equipment, it will be possible to improve the privacy of person-to-person telecommunication. Improving performance, and miniaturization have resulted in the widespread use of mobile telephone systems and notebook computers, which promotes the development of personal communication. One element of personal communication, the Personal Digital Assistant or PDA, can be expected in the immediate future. It is a device that combines in a portable unit a telephone, a television set, and a computer and screen. The PDA's use completes the process that will replace place-to-place communication with person-to-person communication.

But let us revert to Hungarian reality. The authors of the *National Strategy for Information Technology* study urge the government to adopt a policy and decide on an economic strategy. They keep insisting that in Hungary too the info-tech industry is one of the pillars of modernization; that with the widespread use of info-tech devices, it will be possible to improve the quality of life and to realize the dream of low-cost government. They cite as examples the practice of the industrially developed Western countries.

The European Union [EU] has prepared a comprehensive study, known as the Bangemann report. It contains recommendations for the creation of a global information society

within the EU. Singapore has been striving purposefully for decades to make that Asian city-state a global financial and trade center. To that end, it has developed: a strong info-tech industry, capable also of international cooperation; a high-speed telecommunications network; and a one-stop/nonstop system for government services and education—all this in order to induce global corporations to locate their planning and design, development, management, and manufacturing there.

The Irish software industry can serve as another example. Thanks to a special government program, and to multinational corporations' establishing operating units there, Ireland is now one of the world's largest software exporters.

All this is worth noting because, according to the authors of the study, the prospects of the highly specialized software-producers within the Hungarian info-tech industry are good, and they too could become significant exporters. The authors estimate the Hungarian software industry's potential export volume to be between \$200 and 400 million, which is greater by order of magnitude than the present actual export volume. Moreover, software is an ideal industry for Hungary: it requires primarily human resources, has no harmful environmental effects, and, at the same time, its market is expanding rapidly and it is not easy to withdraw direct foreign investment from it.

Siemens, Framatome Agreement for European Pressurized Reactor

95WS0227A Paris LE MONDE in French 27 Feb 95 p 15

[Article by Jean-Paul Dufour: "Siemens and Framatome to Define Their Joint Reactor"]

[FBIS Translated Text] After four years of difficult gestation, the future French-German nuclear reactor is emerging from limbo. On Friday 24 February, the EDF [France's electric power company] board of directors approved agreements to start a "detailed preliminary plan" for the EPR (European Pressurized reactor). The contract, amounting to 750 million francs, will be financed in equal parts by the French and German partners, EDF explained in a press release.

These agreements are the result of negotiations undertaken four years ago with a view to coordinating safety standards for the future French and German nuclear power plants. The discussions among experts from Framatome and Siemens (and their joint subsidiary, NPI), and from EDF, including German electrical engineers and safety agencies from both countries, were often heated; each of them naturally wanted to see the adoption of his own technical options gained from long experience. But about four hundred meetings eventually led to the common concept of a nuclear island (a compound comprising the "nuclear furnace," the safety systems, and the necessary building).

The contract signed Friday will make it possible to spell out this preliminary plan. From here on in, the engineers from both countries will work for two years to develop a

document detailed enough to serve as a basis for implementation studies. Yves Cousin, equipment director at EDF, specified that "this will be a basic model that will not discount any of the adopted industrial solutions." In other words, while the new plants eventually built in France or Germany in 1999 or 2000 will all be equipped with an EPR-type island, this island will still be built by Framatome and EDF in France and by Siemens in Germany, just as in the case of present reactors.

"Avoid the Rejection of Nuclear Power"

This standardization of safety options is part of a logical evolution which began after the Three Mile Island (U.S.) accident in 1979 and which intensified as a result of Chernobyl in 1986. At the same time, parallel steps have been taken at the European level with the drafting of specifications combining the joint European standards known as EUR (European Utilities Requirements). Cousin feels that "this development is unavoidable if we are to avoid the rejection of nuclear power by the public." France and Germany have naturally assumed leadership of this movement to the extent that both have "respective nuclear engineering capabilities unmatched elsewhere in Europe."

But while improved safety obviously remains a major concern of those who are active in nuclear power, they also understand that perfecting the EPR is in their interest. At a time when orders are at a standstill for nearly all the countries of the Western world, the project will give both partners an advantage in approaching the currently booming Chinese market and later, the markets of Eastern Europe, in return for an investment amounting to less than 10 percent of the cost of a single reactor.

Eurocopter CEO Discusses Civil, Military Market Strategy

95WS0176A Paris AIR & COSMOS/AVIATION INTERNATIONAL in French 6 Jan 95 p 25

[Article by Jean-Francois Bigay, CEO of Eurocopter, a holding company owned jointly by France's Aerospatiale and Germany's Deutsche Aerospace: "Crisis in European Helicopter Industry"—first paragraph is AIR & COSMOS/AVIATION INTERNATIONAL introduction]

[FBIS Translated Text] Eurocopter is banking on sales of the Tigre and EC 135, plus the first flight of the EC 120...

Statistics for 1994 confirm the disappearance of what for the last 30 years has been a growth market in the civilian helicopter domain—and its stabilization at 50 percent of the sales average for the last 10 years. For European builders, at least, the situation with regard to military helicopters is no better. In fact, if the world market remains at its present level, the American builders will virtually have realized their visions of monopoly.

In face of these facts, Eurocopter is pursuing an ambitious strategy based on its 50-percent share of the world civilian market and on equipping Europe's military forces at the turn of the 21st century. Our challenge is to surmount the considerable difficulties entailed by the current recession, without sacrificing our future. This strategy—which rests on our lengthy experience in international cooperation and on lowering our economic "break-even point," a goal we have been pursuing for the last 3 years—rests on two main pillars.

In the civilian market, the goal is to preserve our position as a world leader, by upgrading our products to keep them competitive. Given the length of the development cycle, we are currently preparing our offerings for early in the next century. This leads us to the very serious need to increase our self-financing capacity.

In the military market, we expect our Tigre and NH 90 to be equipping the big European armies early in the next century. Our first concern stems from budgetary constraints which, though not threatening cancellation of programs, could slow down their realization. Eurocopter is obliged to guarantee not only that these programs will meet their technical objectives but also that they are completed within the timetables and budgetary ceilings established (these two programs having been contracted on a fixed-price basis). If one adds the fact that the company is plowing a great deal of its own revenue back into the NH 90, and that this investment can only be amortized on the export market, one can see that ensuring a competitive cost per unit is an absolute necessity.

The threat hanging over these programs is not new. Already the Americans' entry into the capital of Westland served to fracture and conquer the only significant market they had not already monopolized: the European market. Any delay or dithering now will be exploited by our competitors to discredit our programs and weaken them. The programs must go forward without trying to rewrite their timetables, and Eurocopter must get to work.

But, as 1995 begins, we do not foresee any improvement in the economic and competitive situation. What we are going to do, therefore, is continue on resolutely with our resizing of the enterprise and with our plans for two new civilian helicopters: to market the EC 135 and proceed to the first flight of the EC 120.

The year 1995 will be most critical for the Tigre program, with the start-up of industrialization and the Dutch and English purchases. Beyond what's at stake for industry, the entire concept of European interoperability and a European defense identity are at issue.

France: SEP CEO Discusses Long-Term Strategy

95WS0184A Paris AIR & COSMOS/AVIATION INTERNATIONAL in French 6 Jan 95 p 51

[Article by Roger Vignelles: "30-Year Plan for Space Propulsion"; introductory paragraph in italics as published]

[FBIS Translated Text] Roger Vignelles, 59, former director of launchers for the CNES [National Space Studies Center], has been chief executive officer of the European Propulsion Company (SEP), a subsidiary of SNECMA [National Aircraft Engine Research and Manufacturing Company], since 1 January 1994.

For the European Propulsion Company (SEP), two major challenges are going to mark the year 1995. First of all, following the resumption of flights by Ariane 4 (announced for the end of February), it will be necessary to successfully complete the 12 launchings planned by Arianespace before the end of the year. And second, during the same time frame, it will be necessary to carry out Ariane 5's first qualification flight while also completing the contractual conditions for its mass production.

Those tasks will be carried out in an important political context and one on which the SEP will keep a attentive eye. I am referring, of course, to the ESA [European Space Agency] Council of Ministers, which, it must be hoped, will be able to formulate new prospects for our activities. The goal for Europe is to enter the 21st century among the leading space powers by being a member of the International Space Station and deepening its policy of access to space. For that to happen, France will have to recover its historic role as the inspirer of European space policy: its partners are expecting and hoping that it will. Besides its natural involvement in space access programs, the SEP anticipates opportunities to see its skills being exploited in the areas of minor propulsion systems and composite materials. The absence of an agreement following upon those resulting from the ministerial conferences in Munich and Grenada would leave the ESA countries and their manufacturers in a situation that would be disastrous in many respects. In France, but also in other places, there is coming to be an increasingly broad consensus regarding the strategic character of space. A recent French interministerial council meeting gave rise to reasonable optimism concerning the future of space activities. It must be hoped that nothing will happen to reverse those trends between now and the fall of 1995, that being the date currently set for the next meeting by the ESA Council of Ministers.

It must also be hoped that following the major election that will be held in France in 1995, the guidelines regarding nuclear deterrence as contained in the military planning law—and retained in the recent budget—will be confirmed.

Getting back to our basic business and the programs that will mark the life of the SEP in 1995, I must not forget the big effort being made by the SEP to provide Europe with plasma propulsion, the source of considerable progress in the design of telecommunication satellites. It is waiting for that effort to be taken into consideration by the prime contractors on those programs on the basis of balanced cooperation between it and them.

But we must look farther ahead than that. The SEP has decided to do so by organizing a partnership consisting of those manufacturers which, like it, are contributing to development of the Ariane's propulsion system. Together they have proposed a 30-year plan intended to maintain and promote the European space industry's position in access to space. That plan has been favorably received in the various agencies, and the first step toward implementing it should occur in 1995 with the start of an initial phase of improving the Vulcain cryogenic engine. But studies will also begin with a view to producing a "demonstrator" for the concepts and technologies destined to replace those already mastered in the Vulcain.

The continuation of that strategy and its possible widening to include other partners is the SEP's response to the need for cooperation among European manufacturers in the field of space. It leaves the door open for closer structural relations and will make it possible by around 2000 for Europe to have unequaled industrial capability in the field of rocket propulsion.

In making that choice, the SEP feels that hypersonic propulsion will be unable to lead to operational applications providing access to space in a reasonably foreseeable future. It can only recommend the establishment of a good system for monitoring technological developments.

In 1995, lastly, the SEP will resolutely continue its establishment of a center for braking systems. Convinced that the needs being expressed in aeronautics, the railroad industry, and road transportation and in connection with racing cars and passenger vehicles call for common skills and technologies, in both of which it possesses recognized know-how, it will continue to set up the technical and industrial plant needed for that strategy.

In all those activities, it will thus be remaining true to the objective it chose for itself several years ago: "mastery of the extremes"!

France: SNECMA Reorganization Described

*95WS0189A Paris AIR & COSMOS/AVIATION
INTERNATIONAL in French 6 Jan 95 p 63*

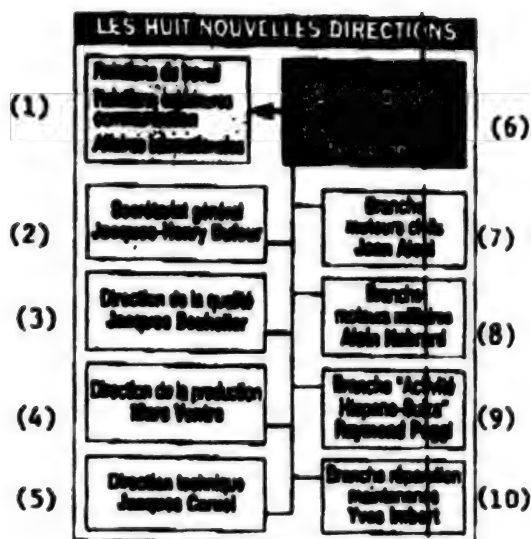
Article by Jean-Pierre Casamayou: "New Organization for SNECMA"; introductory paragraph in boldface as published]]

[FBIS Translated Text] The new organization consists of four "product" branches and four horizontal departments.

The new organization for SNECMA [National Aircraft Engine Research and Manufacturing Company] that was being sought by its new CEO, Bernard Dufour, will be operational on 15 January. It is based on four vertical "product" branches and four horizontal departments: finance, engineering, quality, and production. Those eight structures will report directly to SNECMA's president and its vice president (Yves Bonnet). In addition, the Department of Labor Relations (Claude Loppinet), International Affairs, and Foreign Relations/Communications will also report to them.

The main purpose in reorganizing is to improve the firm's productivity, operations, and ability to react. This goes along with the effort SNECMA has started to reduce costs and shorten cycles. The pattern chosen by the CEO favors the "product" function, thus imitating the Anglo-American systems with which Bernard Dufour has been impressed since the time he spent at GEC-Alsthom. It also reminds one of the organization set up at Pratt & Whitney or Rolls-Royce, which has even turned its military and civilian engine activities over to subsidiaries. The concept in question therefore strengthens an organization centered on SNECMA's basic business, which is aircraft engines.

For example, the new branches for "civilian engines" (under Jean Alesi, former scientific manager) and "military engines" (headed by Alain Habrard) are in charge of all phases of an engine's life from design, production, and financial management to after-sales service. Comprising a Department of Programs and Sales, special teams, and specific assembly shops, they will operate like profit centers. The other two branches (Hispano-Suiza for reversers, nacelles, and power regulation and transmission and Sochata for maintenance and repair) will keep their status as subsidiaries.



The Eight New Departments

Key:—1. Labor Relations, Foreign Relations/Communications, and International Affairs—2. General Secretariat (Jacques-Henry Dufour)—3. Quality Department (Jacques Bouhelier)—4. Production Department (Marc Ventre)—5. Engineering Department (Jacques Caruel)—6. President (Bernard Dufour) and vice president (Yves Bonnet)—7. Civilian Engines Branch (Jean Alesi)—8. Military Engines Branch (Alain Habrard)—9. "Hispano-Suiza Activity" Branch (Raymond Poggi)—10. Repair and Maintenance Branch (Yves Imbert)

To support those operational branches, Bernard Dufour has established or reorganized four horizontal departments. One is the General Secretariat headed by Jacques-Henry Dufour. It comprises the financial, legal, accounting, and management departments as well as the Elecma Division, the subsidiaries (including the SEP [European Propellant Company] and Messier, which are not affected by this reorganization), and holdings in other companies. The Production Department, headed by Marc Ventre, is responsible for SNECMA's three production plants (Corbeil, Gennevilliers, and Le Creusot), including purchases and supplies. The new Quality Department, headed by Jacques Bouhelier, combines the former Computer, Organization, and Quality Departments. Lastly, the Engineering Department under Jacques Caruel is remaining unchanged.

Airbus Head on Company Strategies, Plans

95WS0237A Paris AIR & COSMOS/AVIATION INTERNATIONAL in French 24 Feb 95 p 11

[Article by Jean-Pierre Casamayou: "Strong Warning from Airbus Industrie"]

[FBIS Translated Text] Jean Pierson, who predicts it will be 5 years before the commercial aviation market recovers, lays out his conditions for Airbus's involvement in the future military transport aircraft, and demands rapid action to change the status of the economic interest group [GIE]...

In his first official statements of the year, the administrator-director of Airbus Industrie, Jean Pierson, eschewed the boasting tone traditional for such occasions and sounded a more admonitory note. Even though, for the first time in its existence, the European consortium overtook Boeing in the number of aircraft ordered during the year: 125 versus 120. Speaking before the Association of Professional Aeronautics and Space Journalists (AJPAE), Pierson, who has been confirmed in his position as head of the consortium for 3 more years, set the record straight on several points.

The first concerns coming changes in the sector. He opines that the market will continue to be "relatively modest" and that "during the next 5 years we will not see 800 aircraft ordered worldwide in a single year as in the past." But more sobering for airplane builders is the dramatic change coming in the nature of the market. As a result of the airlines' strapped financial condition and the necessity of constantly renovating their fleets, the very notion of firm orders and options is going to disappear.

"What good is a book full of orders today?" he asks. "That's the question builders are going to have to ask themselves." "In my opinion, no order is definitive until the aircraft is delivered." He noted the case of Air France, where it was only through press reports that he learned the airline had cancelled its firm orders for the A340, and he's still awaiting official notification. As for options, he believes that today they no longer mean anything. "All they do is bind the builder to prices and delivery times."

The other warning given by the administrator-manager concerns the change in the status of the GIE and its transformation into an integrated company. "The GIE system that was established to manage a two-partner program is no longer valid today, when the watchwords are efficiency, responsiveness, and quality of service." According to Pierson, the only solution is to create an integrated company that would also "get us out of the 'shareholder-subcontractor conflict.'" "No one has proven to me that the Airbus system is better than an integrated company, and when I see the progress being made in Boeing's internal organization, I believe it is urgent for Airbus to go forward with this change."

But Pierson's greatest worry is still the future ATF military air transport program (or FLA [future large aircraft]), which European governments would like to launch. "All we have are declarations of intent from our partners, who have expressed a desire to put the ATF program under the aegis of Airbus Industrie," he says. The situation is not at all clear. There is no consensus on the practicalities of how this industrial program would be managed, and the partners have divergent ideas on the subject. For example, some favor the simplest possible aircraft, while others are holding out for sophistication and maximal technology spin-off. Likewise, although there is a consensus in favor of turbo-prop engines, there is no consensus yet on which specific engine, and the choice will be a key determinant of the timetable for the program.

"Under such conditions, Airbus Industrie will have nothing to do with the project, unless the rules of the game are spelled out clearly," the executive warns. "The various

partners must first of all reach an understanding on the role Airbus Industrie is supposed to play, then agreement on practical modalities: an independent company or a subsidiary, how the stock will be divided, and who's in charge." In addition, Pierson is demanding an "effective organization that will not drag down the commercial side of Airbus or burden us with extra managerial costs." And an "effective accounting fire-screen" between civilian and military activities. "Accordingly, I have taken the initiative of organizing some meetings between the members in order to air the divergences," he disclosed.

[box, p 11]

New Projects

During his presentation at the Tokyo air show (cf. p. 14), the vice president of Airbus Industrie, Adam Brown, detailed several of the builder's projects.

In the "narrow-body" family (A319, A320, A321), the consortium plans to improve the A319 and A321. In both cases by enabling them to carry a full passenger/cargo load over transcontinental distances. The "enlarged" A319 is being offered to Air Canada, while a version of the A321 (185-220 seats) with a 50-percent greater full-load range is under study. The niches targeted: transcontinental airline routes and European charters. But for the moment there are no plans to launch an "A322," i.e., an A321 with lengthened fuselage section.

But Airbus Industrie's top priority is renovation of its "250-seat" wide-bodies. This means improving the existing A300-600 and A310 and modifying the basic A330-300. Under consideration are options to convert to passenger seating between 8 sections (4 meters in the A340-200 fuselage) and 17 sections (8.5 meters) of fuselage. Reconfigured optimally by conversion of 14 sections (7 meters), the aircraft could transport 340 passengers in three seating classes over the same distance as a Boeing 767-300ER.

At the same time, the European consortium is developing the A340-"800". With higher maximum weight at take-off, an improved engine, and extra fuel tanks, this version of the A340-200 will be capable of transporting 260 passengers in three seating classes nonstop over a distance of more than 8,000 nautical miles (14,800 km), equivalent to 17-1/2 hours of flying time. It can also be configured with sleeping berths for 140 passengers to fly nonstop a distance of 15,700 km (18-1/2 hours) between Europe and Australia. Next, the GIE has plans to launch a family of new "phase II" A340 fitted out with a new 180 kilonewton engine, which SNECMA [National Company for the Design and Building of Aircraft Engines] and General Electric are developing. This family could eventually include a stretch version, elongated to accommodate 50 more passengers, that performs as well as the current A340-300; a new version of the A340-300 with the performance characteristics of the A340-200; or an A340-200 capable of staying in the air for more than 20 hours (Cf. A&C No. 1480).

As for the super-jumbo, it is still in the design studies phase. Adam Brown admits that Airbus Industrie is unsure whether development of such a program ought to proceed

in competition with Boeing, or alternatively in cooperation with it, under the auspices of VLCT [Very Large Commercial Transport]. But that has not stopped the consortium from introducing plans for an A3XX weighing up to 476 tons at take-off and able to carry 530 to 840 passengers over distances up to 13,700 km, with the possibility of elongating the body an additional 6.5 meters to increase capacity to 630-680 passengers in three seating classes, or 1,000 passengers in a one-class configuration. Airbus plans to launch predevelopment work at the end of this year, which means it could go into service in the year 2003. [end box]

France: Thomson Consumer Electronics Becomes Thomson Multimedia

95WS0228B Paris L'USINE NOUVELLE in French
9 Feb 95 pp 30-31

[Article by Jean-Pierre Jolivet: "Multimedia: Thomson's New Face"—first paragraph is L'USINE NOUVELLE introduction]

[FBIS Translated Text] Thomson is surging into the multimedia markets. Overly dependent on the market for television sets, TCE [Thomson Consumer Electronics] is gambling on an escape into the future, with multimedia. A daring gamble. But the group has already mastered much of the basic computing technology.

TCE thinks it has finally found its niche in the technological proliferation and expansion of multimedia. At the end of March, TCE will change its name to Thomson Multimedia (TM). Simultaneously it will acquire Thomson Broadband Systems, which specializes in digital image processing, fiber optic transmission, and videocommunications network engineering. Its annual turnover is 450 million French francs [Fr] and employs 450 at its Brest facility and Rennes Electronics Laboratory (LER); up to now it has belonged to Thomson-CSF.

Technological Strengths

For the world's fourth largest manufacturer of television sets, this is a decisive change of direction. With its survival hanging by a thread earlier in the decade, with no real fall-back strategy after the defeat of European HDTV [high-definition television], and overly dependent on the TV set market that accounts for nearly 50 percent of its turnover, TCE was looking for an outlet. Alain Gomez, president-general manager of Thomson, even considered jettisoning that money-losing activity, which made a poor fit with what had become the mainstay of the group, defense electronics.

Alain Prestat, 43, who parachuted in from France Telecom 3 years ago to become head of TCE, has given new impetus to a group that had lost faith in itself. Today, he must steer the group through tremendous change. First of all, because the market for television sets is no longer really a growth market. Pressure on prices is forcing them down by 10-20 percent per year. Second, technology is pushing back the frontiers of consumer electronics at a furious pace. Images are being digitized. Transmission technologies are multiplying, with satellite, cable networks, and tomorrow information superhighways. Interactivity is penetrating into

households, with dial-up television programs, games, and teleshopping. The television is becoming a veritable micro-computer capable of accepting multimedia information. "Instead of just being builders of 'boxes' (television sets), we are becoming suppliers of complete systems," TM officials explain.

The revolution in digital imaging, which is going to completely change the landscape of the consumer electronics industry, represents a fantastic opportunity for the group, which has renamed itself for the occasion. Alain Prestat's gamble is audacious. Even risky, some say. Be that as it may, the group has already mastered much of the basic computing technology. Its laboratories at Illkirch, Villingen, and Indianapolis, as well as the one at Rennes (belonging to Thomson Broadband Systems), have been working for a long time on digital image compression techniques compliant with MPEG-2, the worldwide [Motion Picture Expert Group] standard. Thomson, having invested heavily in the European D2Mac and HDTV programs, is finally beginning to see some payoff. "Nearly 80 percent of the work done in the last 10 years on HDTV turns out to be useful in digital television," say TM and Philips engineers.

Thomson's participation in the Hughes direct satellite television system (DirectTV) has given it a head start in digital reception equipment. Since the service started up last summer, TM has sold more than 600,000 of its kits (antenna and decoder) to American households. In 1994, sales of 1.5 million units are expected.

At the same time, the search continued for more alliances. The partnership with Sun Microsystems has enabled Thomson to develop a system architecture dubbed "Open TV" destined for interactive services and multimedia. The system is now being promoted intensively by American and European broadcasters and cable operators. In the video domain, TM is working with Toshiba on development of the future mass-market digital high-definition video recorder. Finally, the French company has just launched itself into the field of video CD (digital compact disks). It will participate, alongside Matsushita, Toshiba, Hitachi, and production studios such as Time Warner, MCA, MGM, and Viacom-Paramount, in the work of developing an industry-wide standard.

Profits Restored

The offensive is an impressive one, the brainchild of a management team that prides itself on increasing profitability. For the second year in a row, the consumer products subsidiary of Thomson SA will see growth in excess of 10 percent, strengthening its position in television sets both in Europe (13.2 percent of the market) and the United States (20 percent). That helped boost total sales in 1994 up to around Fr39 billion, with hopes for a fourfold increase in operating profits (about Fr600 million). But that will not be quite enough to pull it out of the red, given its sizable debt overhead, which is almost six times the total of its equity capital.

Since his arrival, Alain Prestat has labored to effect a "cultural revolution" in an enterprise paralyzed by the weight of a history of successive acquisitions. In the group's 39 manufacturing plants, the race for greater productivity has accelerated. Improvement of the production process reduced the

rejection rate on cathode-ray tubes to just 0.54 percent and increased the performance quality of its European television-set manufacturing plants by 10 percent in 1993.

Financing Needed

Marketing and sales have been reorganized. The marketing effort is now organized by broad zones. An autonomous entity, Marketing and Sales, headed by a Chinese, has been created to respond to the special demands of the Asian market. In France, the three sales forces—all of which were targeting the same clients—have been replaced by two entities: one responsible for major accounts, the other in charge of smaller resellers. At the same time, repositioning of product lines (Thomson, Telefunken, Saba, Normende, Fergusson) in Europe has accelerated thanks to the introduction of new types of television sets.

Having put the group's house back in order, Alain Prestat believes it is vital to go forward. Given the scope of the task, it's going to require a lot of money. The Fr10-billion debt burden hanging over TCE is a serious handicap. That's the crucial problem management will have to resolve. And the future privatization of the Thomson group must provide the necessary financial horsepower.

[box, p 30]

Development Poles

Digital video compression:

- Work on MPEG compression in laboratories at Illkirch, Villingen;
- Development of special integrated circuits for this technique;
- Participant in the "grand alliance" of industries and laboratories working together to develop HDTV in the United States;
- Member of Eureka 1187 ADTT, the research program on European HDTV;
- Partner in defining the standard for the future high-definition video recorder;
- Participant in defining the standard for future video CD

Interactivity, access control, coding, security:

- Work on user interfaces and "navigation systems" in programs;
- Development of operating systems for interactive television;
- Development of access control and crypto techniques;
- Alliance with Sun Microsystems to develop a complete environment for multimedia interactive services;
- Partnership with Hughes in direct satellite digital television

Display:

- Development in partnership with Thomson-CSF of technologies for liquid-crystal flat screens;
- Partnership with Philips, Sagem, and Merck to develop and produce liquid-crystal flat screens (Flat Panel Display)

[end box]

France: Nine Firms Interested in Participating in Bull Privatization

95WS0220A Munich *COMPUTERWOCHE* in German
10 Feb 95 p 70

[Article by "I.D.G./vwd": "Nine Firms Want to Participate in Bull Privatization"; "Very Differing Goals"]

[FBIS Translated Text] Paris—The French government has put nine interested companies on the short list for the privatization of the state computer group Bull. Five of these want at least a ten-percent share each.

Named so far are NEC, Motorola, the Singapore-based PC supplier IPC, the French Holding Quadral, as well as a consortium under the direction of Dassault Automatismes. Interested parties wanting less than a ten-percent share include IBM, the Bull Executive Partners, Bull's employees and a financial institution.

There is, however, still no official confirmation. Which firms will be chosen for Bull's privatization and what shares they will acquire will probably be decided the end of February. This decision could have very far-reaching consequences for the future of Bull, as the interested parties have very differing goals.

Motorola, Inc., for instance, wants to push their own PC power chip as the standard in the Bull servers, thus giving them an advantage against the competitor Intel. In contrast, the Holding Quadral, which together with AT&T made an offer to take over 40 percent of Bull shares, wants to transform the French group into a system integrator for telecommunications. According to press reports, however, this project met with the resistance of Bull management. Dassault Automatismes is primarily interested in the part of the company dealing with automatic teller machines and electronic counting systems.

France: Bull's Privatization Difficulties Presented

95WS0246B Paris *LE MONDE* in French 1 Mar 95 p 18

[Article: "Bull's Unachievable Board of Directors"; first paragraph is *LE MONDE* introduction]

[FBIS Translated Text] The private-sale privatization which the government wanted shows itself to be unattainable, because of antagonisms between the candidates...

Have the authorities yet found the shareholders to privatize Bull? Nothing is less certain. At any rate, the task of putting together, via the private-sale route (i.e., without putting stock on the Bourse), the "board of directors" which the government wanted the French computer builder to have looks quite difficult. Now that American telephone giant AT&T and France's Quadral group, which had hoped to become lead shareholders, have withdrawn their joint offer to take 40 percent of the capital, a "patchwork" shareholdership of the kind preferred by Jean-Marie Descarpentries, Bull's CEO, seems unavoidable.

The solution looks simple on paper. You have four large shares for industrial operators—Japan's NEC and Singapore's IPC, both formal candidates in the running, and U.S. firms Motorola and Sequent, both of which have signaled strong interest. This makes four chunks [each]

representing 10 to 15 percent of the capital. Then you fill in with smaller shares, including one for IBM, which already has a 2.1-percent stake. The employees—more specifically, the high-level management, which was encouraged if not actually compelled to support the idea last year—would also acquire an interest. As for France Telecom, it would keep its current 17-percent share. Under this scenario, the state would keep the remaining 30 to 35 percent, assuming no defections.

The first difficulty with the scenario is arithmetical: The state's share of capital absolutely must not exceed 32 percent: Otherwise, the combined public-sector bloc (the state plus France Telecom) would still have a majority! The second is strategic and emotional. When putting together a "patchwork" board of directors from scratch, you're better off if the shareholders who must cohabit aren't from antagonistic cultures and don't have completely divergent interests.

Just imagine how much "fun" the authorities are having with this exercise! The accord on Unix systems that was concluded in early February between Japan's NEC (Bull's traditional partner, which supplies big systems to the French group) and the U.S.'s Hewlett-Packard bodes ill for Bull. For the last 3 years, the French group has hitched its wagon to IBM in the domain of Unix machines, having preferred IBM to... Hewlett-Packard! The latter, as part of its new alliance with NEC, has just launched a product line clearly intended to torpedo IBM's AS 400 minicomputers... Another wrinkle: Motorola might be interested in cooperating with Bull on machines based on RISC [Reduced Instruction Set Computing] microprocessors... another line in competition with IBM!

This imbroglio may be what's behind delays in the privatization calendar. The authorities, who originally had set 22 February as the last day for submission of definitive bids, have now extended the deadline "by a few days."

France: Philips Looking for Partners in Computer Industry

BR1703125595 Paris *ELECTRONIQUE INTERNATIONAL* in French 2 Mar 95 p 12

[Frederic Fassot report: "Philips Plans Computer Industry Partnerships"]

[FBIS Translated Text] Eindhoven—Jan Timmer has been CEO of Philips since 1990. Now that he has turned around the Eindhoven giant he has something to smile about: "The Centurion program for company revitalization has not yet been completed, but it has changed. It is no longer a defensive program for making staff cuts but is an offensive scenario intended to boost our activities and increase our profits." It has to be said that Philips profits were comfortably up last year. The ranks of the company workforce even increased by 8,600 to 253,000, although in western Europe the number of employees fell by 3,000 and this trend should be confirmed in the coming years. Geographically, one of Philips' priorities is to develop its Asian activities (which currently account for 15 percent of its sales) while strengthening its industrial presence in countries where labor is cheap (Asia and Eastern Europe).

It will also have to improve sales in the North America where turnover fell by 5 percent last year.

IBM Future Philips Partner?

Where products are concerned, Philips obviously does not intend missing the boat in the light of the rise in multimedia applications. Jan Timmer announced: "In this domain nobody has a complete range (of products and services) and we will therefore have to forge partnerships." Stressing Philips' strengths in this area which is outside consumer products activities (telecommunications—even if this branch is still running at a loss—, semiconductors, flat screens, CRT's, and monitors), Jan Timmer implicitly admitted that he was looking for a partnership in the computer industry. The partnership will not be with Apple: The Philips CEO denied that he wanted to take a controlling stake in the Cupertino firm or even wanted to strike a cooperation agreement with it. IBM, on the other hand, looks more like the kind of company he has in mind. CEO of the French subsidiary Francois Maudit told us: "In the computing sector what we lack is large systems know-how, both from a software and a hardware point of view." He stressed a few hours earlier: "The agreement we recently signed with IBM in Germany for semiconductors was no coincidence."

The company is also turning to the computing industry for the definition of the future CD-video standard where Philips and Sony are facing off against Toshiba, Pioneer, Matsushita, TCE, and a few others. Regretting the fact that the battle is being fought in public, Jan Timmer considered that the concept that is finally selected should be able to operate for 25 years, that is to say it should be capable of meeting future requirements when consumer electronics merges with computing. Francois Maudit explained: "Even if the initial aim of CD-video is to replace pre-recorded magnetic tape, in the longer term it must be possible to connect this drive to television sets and PC's: What is at stake here is audio-CD, photo-CD, CD-ROM, and CD-I compatibility." He does not rule out the possibility of industry waiting until it can offer a writeable product before it can conquer the market.

Lastly, Philips is intent on reducing the impact that a few of the company's star products (DCC and CD-I drives) will have for the future of the company and stresses that it is still too early to consider whether they have been a success or failure commercially. It is true that for the time being sales are disappointing: 800,000 CD-I drives and even fewer DCC decks (an undisclosed figure). Jan Timmer points out: "If this year, by magic, the audio cassette market were suddenly stormed by DCC technology (with the lower prices that the volume effect would cause) then Philips' turnover would rise by a mere 0.5 percent." He thus proved that the company's success is not dependent on the success of this type of product.

Production of GSM Terminals and 16/9 Tubes Not Yet Started in France

Philips' 1994 sales in France amounted to 23.5 billion French francs. The company estimates that it holds 22 percent of the consumer electronics market and that it gained a 1-percent market share in televisions (for which it claims to hold 31 percent of the French market) to the

detriment of Asian importers. For 16/9 TV's it has 50 percent of the market share (100,000 sets sold in France in 1994). Half of all 16/9 sales are generated by TV sets manufactured in Dreux. On the other hand, 16/9 tube production has not yet started up in France. Considered on numerous occasions it is still seen as "possible" as the market takes off (but for the time being these tubes are produced in Germany at Aachen). Last year Philips sold 50,000 CD-I drives in France plus 6,000 CD-I video cards. Some 50,000 DCC decks had been sold in France. This year the aim of Philips France is for 18 percent of its consumer electronics sales to be generated by new products (16/9's, DCC's, CD-I's, and combined TV and video recorders) as opposed to 10 percent in 1994. Finally the production of GSM, DECT, and Bi-Bop terminals has still not begun at the Le Mans plant which output a million terminals last year (cordless phones and minitel videotex terminals). Production is still being researched, however, and France has inherited the group's GSM activities previously dealt with by PKI. However, for the time being Philips is getting its supplies from Nokia while it waits to introduce its new range of handsets planned for the beginning of 1996.

Germany: SNI AG Reorganizes To Improve Service

95WS0219A Munich *COMPUTERWOCHE* in German
10 Feb 95 p 31-32

[Article: "SNI Introduces Itself in London as Provider with Ambitions: In Future Siemens On Demand?"]

[FBIS Translated Text] London—For months Siemens-Nixdorf Informationssysteme [SNI] AG of Munich has been making an effort to indicate the birth of a new spirit. Things were no different in the pre-CeBIT press conference in London. The re-engineering concept, which was proclaimed by new boss Gerhard Schulmeyer when he took over at the faltering company last fall, seems to be bearing its first fruits.

In the new organization there are only three divisions: the departments of service, solutions and products. According to management, which is strongly committed to this approach, the corporate structure mirrors market requirements and expresses a direct relationship with the client.

Wolfgang Jaeger, brand-new managing director, who came to SNI in fall of 1994 from Digital Equipment, explained how SNI hopes to put the concept of nearness to the client into action. He said that because of rapidly changing market conditions clients demand "that Siemens-Nixdorf must achieve true competence in the client's relevant business area before a contract is signed." That is why SNI will concentrate its resources and technical knowledge in solutions companies or centers of competence where the industry in question is most centrally involved.

Decoded, this means that SNI will establish representatives at industrial focal points. For example, competence in the sphere of banking is to be moved to London, the European financial metropolis. The automotive industry would be taken care of from Germany—possibly with a

Stuttgart location—and electronics from the U.S. Knowledge and experiences gained in the process would be transferred to other countries within the context of "major projects groups."

The concept struck the participants as illuminating, but it raised the question of how a company with more of a bureaucratic tradition plans to carry out this transformation in practice. The lack of mobility among SNI workers could have a negative effect. Jaeger has this fear too: "It is not so easy to convince a specialist to move voluntarily from Munich to London or Stuttgart."

Horst Nasko, former spokesman for Nixdorf directors and now deputy director in chief for SNI, has opened up a new source of income for the service industry in the area of outsourcing. As Daimler-Benz did earlier with Debis, the Munich company also plans to move the resources of the company as a whole towards multiple uses. In addition to 45 mainframes, Siemens also hopes to offer the use of its worldwide company network.

Outsourcing activities began two years ago with the founding of Sietec Consulting GmbH and Co. OHG (SCG), but now they are to be expanded significantly. Together with the parent company, SNI will found a new company, management of which will be taken over by the IT daughter company.

The managers will try to make up for their late entry into this lucrative market by offering more than mere computer capacity. The plan is to offer advice, production and operation of hardware and software as well as network services as part of a distributed and decentralized DP for the clients.

The new company is to operate worldwide with about 1,800 employees, corresponding to the Siemens network.

The deputy director has great plans for the BS2000 mainframes. The proprietary operating system BS2000/OSD is to be expanded continuously by public programming and communications interfaces so that it does not become a dead end for the clients. He considers the supercomputer an important building block for SNI's client-server concept.

Nasko also announced the intended direction of progress in hardware for the big guns: "For our mainframes, we are working on conversion from CMOS [Complementary Metal Oxide Semiconductor] processors to tradition RISC-CPU's [Reduced Instruction Set Computer-Central Processing Units]." He is referring to the calculating components of MIPS [Million Instructions Per Second], which SNI already uses for its UNIX machines. Nasko is thinking of the future MIPS chip R-10000 as target CPU; it guarantees a better price-to-performance ratio than current components.

This conversion does demand an extensive modification of the operating system, which is largely written in the

procedural language SPL, with some additional functions in C. Nasko did not want to give any precise timetable; all that could be discovered was that the first chips should be available in the laboratory in the third quarter. MIPS mainframes cannot be expected before the end of 1996.

The future MIPS component gains additional significance for SNI because it has been selected as the welding point for the technologies of SNI and the recently acquired Pyramid Technology. As already announced, the Munich company is putting \$207 million, or \$16 per share, on the table for the outstanding 83 percent of the capital of the California company. Nasko stressed that the manufacture of UNIX multiprocessing computers based on MIPS was to go on independently. That is decisive in particular for the further development of Pyramid software.

Klaus Gewald, who heads the midrange business section of SNI, sees the acquisition of Pyramid as bringing him a step nearer to his goal of establishing UNIX in the domain of Enterprise Computings. The credit side of the ledger for the division reveals so far 10,000 computers of the RM-200 type sold so far, 2000 RM-400 machines provided and already 100 large-scale systems of the RM-600 type installed.

The most recent product from the developmental laboratories are clusters of RM-600 multiprocessor computers. A maximum of four UNIX servers can be linked into a total system with up to 96 processors. The recommended data bank is Oracles Parallel Server (OPS).

The takeover of Pyramid has created an operating base for SNI in the U.S.—the market which Walter Roessler, the man in charge of PC's, will work on this year with his troops (on SNI's PC strategy, see COMPUTERWOCHE Nr. 5 of 3 February 1995, p. 4: "SNI's PC Area . . .").

Peter Page, who came to the company in April of 1994 from Software AG, explained SNI's strategy in the area of applications software: continued production of mainframe software for open platforms, along with distributed structure solutions on the server side and component-based applications which are linked by software bus.

Management representative Nasko gave a survey of SNI's activities in multimedia, assigning the greatest possibilities for growth to this application field and also regarding it as "one of the most important driving factors for information technology as a whole." "PC's without multimedia properties," he continues, "will soon be virtually unmarketable."

The house of Siemens also hopes to occupy a strong position in the video-on-demand business. With the parent company, Siemens, and its ATM [Asynchronous Transfer Mode] knowhow, he says that it would be possible to offer the network technology. SNI could provide the suitable multimedia PC's and would also provide the servers. The only missing link in the chain is the set-top boxes, which would be provided by consumer electronics manufacturers such as Philips. Does this mean that in the future we can look for "Siemens on demand"?

Netherlands: Fokker CEO on Competitiveness Strategy

95WS0175A Paris AIR & COSMOS/AVIATION INTERNATIONAL in French 6 Jan 95 p 24

[Article by Ben J.A. van Schaik: "Creating a Europe of Regional Aviation"; introductory paragraph in italics as published]

[FBIS Translated Text] *Ben J.A. van Schaik, 50, a former engineer for Mercedes-Benz, has been chief executive officer of Fokker (in the Netherlands), a subsidiary of the German Daimler-Benz group, since 1 April 1994.*

Nothing will ever be as it was before in the aeronautical industry. We have experienced one of the deepest recessions in the history of commercial aviation. Deregulation and liberalization have dramatically accelerated competition among airlines. And there is a clear move toward leasing planes rather than buying them.

Because of slower demand, the seller's market has become a buyer's market. Moreover, airlines no longer assign the same importance to an aircraft's technological merits. Their main interest is in buying or leasing seats per kilometer at the lowest possible price in order to succeed in a very competitive context.

For a manufacturer like Fokker, there is only one way to react in the face of this new deal. This means that it is necessary to accept the challenge and adapt to the realities of the marketplace. Fokker will therefore continue the restructuring and cost reduction measures already underway to strengthen its competitiveness. We are proposing new engineering concepts in order to respond to demand much more quickly than before, and we are introducing more flexible production processes in order to better satisfy the companies wanting to get deliveries quickly. In addition, we are currently working to reduce our production costs without reducing the high quality that gives Fokker its reputation in the world. Lastly, to serve the market for leased aircraft, an autonomous company called Debis Air France will be established during the first quarter of 1995. That firm will manage the portfolio for leased Fokker aircraft. It will have the know-how as well as the financial means for meeting the market's needs.

With over 500 firm orders on the books, the new generation of Fokker aircraft clearly shows that it meets the need for air transport. The Fokker 50 turboprop is in second place in its market and has surpassed all its competitors in recent years. The Fokker 100 jet also dominates the market in its category. And the newest member of the family—the Fokker 70—is proving to be a high-performance product, with 55 firm orders and options on the books. This has compelled us to make the happy decision to increase that aircraft's rate of production in 1995.

But despite that good performance, we are continuing to improve our products and to develop new versions of our aircraft. We are preparing for the future.

In close cooperation with DASA [Daimler-Benz Aerospace], Fokker's parent firm, we are conducting a market

study regarding a new-generation commercial jet aircraft. This project, provisionally known as FA-X, could lead to the introduction during the next decade of a new 120-seat aircraft that would perfectly complement the Fokker 70 and Fokker 100.

Belonging to the Daimler-Benz group (for the past two years) has considerably strengthened our position, and it ensures Fokker's long-term viability. In the Daimler-Benz industrial strategy, Fokker plays the leading role as far as regional aircraft are concerned. The alliance with our German partner is also an important step toward a greater consolidation of the European regional aircraft industry. Today there are too many manufacturers for too few customers. Thinking "European" rather than "nationalistically" is therefore more than ever the only way to enable Europe to retain its first place in the field of aircraft for regional transportation. The European industry has no alternative except to increase its size if it wants to remain competitive and regain its profitability.

Netherlands: Philips Increases R&D Spending

BR2203123095 Amsterdam ELSEVIER in Dutch 4 Mar 95 p 65

[Report by Hans Crooijmans: "Philips Boosts R&D"]

[FBIS Translated Excerpt] Amid all the jubilation about Philips' record profits and the rumor about the imminent departure of CEO Jan Timmer, a strategic choice was made in Eindhoven last week, which went largely unnoticed. After all the austerity and cost-cutting, more money has been found for R&D.

Both the "central research budget," i.e., the money which comes from the company's coffers, and contract expenditure by the individual Philips group companies are increasing significantly this year. Last year the company had already sent out clear signals by increasing R&D expenditure by almost 9 percent to 3.7 billion guilders. "Philips Invents for You" is an advertising slogan which is clearly set to last beyond the turn of the century. [passage omitted]

In the meantime, the proportion of fundamental (purely academic) research efforts at Philips has fallen. Management dictates that money and human resources have to be used primarily for specific products that are likely to be commercially successful. The Natlab, traditionally regarded as a stronghold where many researchers could ponder undisturbed on new discoveries, is now much less dominant in Philips R&D than it used to be. A great deal of product and software development work now takes place in the environment of the product division which issued the relevant instruction.

Philips is taking great pains to keep secret the amounts it is investing in specific projects. The company is a little more candid about the approximate qualitative choices it is making. In consumer electronics, for example, which is still the most important division within Philips, the emphasis is increasingly on multimedia, said a spokesman. Philips understands that consumers leave new systems and

possibilities on the shelf if they do not understand them or if they are considered "too technical." In the near future, therefore, Philips is going to invest many tens of millions of guilders, not only in optimizing digital television and liquid crystal displays (LCD's), but also in video-on-demand systems, together with user surveys and technologies enhancing ease of use.

The very fact that Philips is bumping up its R&D efforts is a good sign. After all, it fits in with the company's objective of sharply increasing turnover in the years ahead. Investment in technology is indispensable for any company wanting to grow and stay out in front in electronics. When asked about their R&D efforts, companies generally give a percentage of their turnover—and not without reason.

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